AYURVEDA SIKSHAA

(A TEXT-BOOK OF AYURVEDA)

Volume II—Section I.

Deha Dhaatu Vijnaanam

(The Thirteen Constituents of the Human Body)

EDITED BY

Dr. A. LAKSHMI PATHI,

B. A., M. B., C. M., BHISHAGRATNA.

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(AYURVEDA SIKSHA)

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BEZWADA.

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Deha Dhaatu Vijnaanam.

INDIAN MEDIC
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EDITOR'S PREFACE.

"Dosha Dhátu Mala Moolamhi Sareeram"

"The essential constituents of the human body consist of Doshas, Dhátus and Malas."

Any other substances that may be found in the body are to be included in one or the other of these three categories. Therefore, these three are called "Deha Dhátús" which means supporters of the body. Deha Dhátu Vignánam therefore means a knowledge of the essential constituents or supporters of the human body.

We have named this Section "Deha Dhátu Vijnánam". The English rendering of this name that has been adopted by us is "The Thirteen Constítuents of the Human Body."

In the study of Anatomy and Histology, Ayurveda and modern Sciences, are fortunately very similar. Both accept the cellular theory.

Sareerávayavástu Paramánubhédéna
Aparisankhyeyah Bhavanti Bahuutwát, Atisaukshmydt
Atindriyatváttcha–*Cha. Sareera. 7-27.*

The constituent elements of the human body are innumerable because they consist of minute particles (Paramánus-minute cells) which are so numerous and so minute that they cannot be

seen by the naked eye or other sense organs (Atindriyácha). Váyu is the vital substance that is responsible for the union, dis-union, development and dis-integration of these atomic cells.

Teshàm Samyoja Vibhàge,
Paramànùnàm Kàranam Vàyuh,
Karma Swabhàvascha. (Cha. Sareera 7-27).

The action of Váyu, again, is due to the Eternal Energy (*Karma*) which by its own nature causes the changes of integration and dis-integration.

In the theory of disease also, both adopt the same hypothesis. As regards the causation of certain diseases by microbic infection (Microbic diseases) and of certain others by changes that take place in the tissues themselves (Metabolic diseases), both Ayurveda and modern medical science hold similar views.

Modern medicine has advanced very much, no doubt, in further analytical study of the human body, but in the synthetic study of the man as a whole, Ayurveda is still superior. Instead of considering the human body as consisting of so many cells, tissues, organs, muscles, vessels and bones or as a compound of so many metals and non-metals, the Ayurvedic Scientists conceived a comprehensive and synthetic view of the living human body as consisting of Nutrients, cells and debris. I shall only enunciate and shall not discuss this matter here any further, because this is the real subject of study in this book.

The above conception of the human body as made up of certain in-going nutrients, certain stationary cells and tissues, and certain out-going excretions is very accurate, comprehensive and scientific:—

(1). The nutrients are three, called Thri Dhátus (Thridoshas). They are very likely to be deranged easily by unsuitable food, climate or other environments, thereby causing ill-health or disease. Therefore, they are often called the Thridoshas. When they serve as nutrients they are called thri-dhátus, and when they are responsible for causing disease, they are called thri-doshas.

(2). The Stationary cells and tissues are of seven categories and,

(3). The outgoing excretions are mainly three.

These thirteen (3-7-3) constitute the human body according to Aayurvéda.

Disease is generally defined as derangement of the Thridoshás and health is defined as an equillibrium of Tridoshas - these three nutrients. Inter-action of the tissues with the deranged nutrients naturally effects the health adversely and it is therefore called a disease.

We have in the following pages endeavoured to elaborate on the nature and functions of these three main sets of constituents of the body which when counted separately become thirteen, i. e.,

Three Doshás, Seven Dhátus and Three Malas. This in short is the Physiology and Histology, and Pathology of the Human body according to Aayurveda.

In compiling this book, I have not in the least hesitated to quote extensively and also to extract bodily from some of the articles published by my learned friends Dr. Kaviraj Dhirendranath Ray, M. Sc., and Dr. Dhirendranath Banerjee, M. B. (Cal). M. D. (Berlin) who have made a close study of this subject during this generation.

I acknowledge my indebtedness to them by offering them my heart felt thanks. I hope that the principles of Ayurveda will be better understood by modern medical practitioners after a study of this book-let in English which however cannot be said to be perfect. It is necessary to study the subject in the original books in Sanskrit in order to secure a thorough understanding of this intricate and interesting subject.

Circus Maidan,
GOVERNORPET,
BEZWADA,
28—2—'45

Dr. A. Lakshmi Pathi,
Editor.

Ayurveda Siksha

(A TEXT-BOOK OF AYURVEDA)

Volume II—Section I.

Deha Dhaatu Vijnaanam

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INTRODUCTION

Our scheme for the compilation of 'The Text Book of Ayurveda' is as it has been stated in the beginning (refer Ch. I. Vol. I) includes Eight Volumes. Though the volumes do not exactly correspond to the Asthangas—Eight Sections., namely—Kaaya–Medical Treatment,—Baala–Treatment of Children.,—*Graha*—Mental Diseases., — Vurdhvanga—Diseases of Head and Neck—Salya—Surgery.,—Damhthra—Toxicology.,—Jara—Treatment for the prevention of Old Age.,—and *Visha*—Aphrodisiac Treatment—according to the orthodox classification, we have tried to include all these subjects in the Eight Volumes. Further, the teachings of Ancient Authors have been amplified by the addition of valuable information secured by the study of modern sciences. These additions are intended to supplement Aayurveda with the aid of latest researches and not to suplant it.

In Volume One, the Historical Background (Bhaaratiya-Vijnaanam) has been dealt with in Section One, and in Section Two the Philosophical Background (The Darsanaas). These two sections comprise a knowledge of the fundamental sciences on which the Science of Ayurveda is based. They form the pre-medical studies of the student. The Aayurvedic student has now to enter upon his pre-clinial studies commencing with a knowledge of Anatomy and Physiology of the human body. This is included in Vol. II, Saareerasthaana.

Saareera Sthaana is divided into two sections. Section One deals with Deha Dhaatus (Deha Dhaatu Vijnanam), and Section Two deals with the details of Anga-Pratyangaas and it also includes a knowledge of the Purusha and Prakriti according to Ayurveda. An introduction consisting of four chapters dealing with 'The Thridhaatu Siddhanta' has been added in order to make the understanding of the subject easier for a beginner.

CHAPTER I.

Superiority of Aayurveda ❖

[CONTENTS :—Superiority of Aayurveda – Basis of civilization – Pure Science – Physics – Chemistry – Physiology – Diagnosis – Hygiene – Treatment – No Antagonism.]

I. BASIS OF CIVILISATION

1. I want you to realise that if Aayurveda dies in this country, the civilization of Hindusthan will also die with it and there will be an end to the World's civilization also. Aayurveda is connected with Hinduism so intimately and the habits and customs of the people are so much influenced by the teachings of Aayurveda, that if Aayurveda goes down, the whole fabric of the Hindu Society is destroyed. I wish to know if you are prepared to accept that proposition.

2. PURE SCIENCE

2. I assert that even as a pure science, the advancement that Aayurveda made is superior to that of modern science even to day as you will see from following illustrations :—

I. PHYSICS,

1. Physics :—Text books on modern physics were teaching us till recently that the carrier of sound was the air as proved by the 'Clock and bell jar experiment'. But Aayurveda teaches that 'Aakaasa', Ether, is the carrier of sound. **'Sabda Gunaka maakaasam'.** The transmission of sound by Radio has now proved the truth of that statement. Sir

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❖ Extracted from the Paper on "Thridhaatu Siddhaanta" presented to the 10th Andhra Provincial Medical Conference at Guntur, on 28.11-43 by Dr. A. Lakshmi Pathi, B. A. M. B. & C. M., Bhishagratna.

C. V. Raman has further proved that the waves of sound could be converted into waves of light by passing them through a crystal. He showed this phenomenon visually through the magic lantern. This is an old Siddhaanta that the grosser Elements are derived from the finer Elements. "Aakaasadvaayuh, Vaayor Agnih, Agner aapah" etc., Even today there are Yogis who can convert one state of matter into another by their Samyama Sakti.

(See Paatanjaji Yoga Sootra-Vibhooti Paada-Ch, 3).

II. CHEMISTRY.

II. Chemistry :—Converting baser metals like copper and mercury into gold is well known in India to the Yogis. As the Yogi believes that all things in the world are derived from one thing, the Yogi occassionally demonstrates the convertibility of one thing into another, and as an example, he demonstrates the conversion of a bit of copper or a globule of mercury into gold. The introduction of a minute particle of Taamra Bhasma into a heated globule of purified mercury, or of a minute particle of Rasa Bhasma into purified copper, transforms the respective metals into gold. The Yogi uses the juice of some leaf, the most common being "Bhoodhaatri" in the process of the purification of these metals. The whole process is a secret one. Recently, a Saadhu who is also an M. A, in Chemistry demonstrated this to an Aayurvedic physician at Bhimavaram. I have recorded his statement in my 'Text Book of Aayurveda'. Sec. 2. Vol. I. These Saadhus do not accept any remuneration in return. After the demonstration, they do not stay in the same town. I believe that the secrecy lies in the fact that it is the powerful rays emanating from the Yogi's Mind, (i. e,) of the Soul Force that are very important for the chemical and physical changes that take place in this transmutation. I am told that a Yogi can convert a bit of stone into a diamond.

III. PHYSIOLOGY.

IV. Physiology :—The modern scientist gives great importance to the circulation of blood, but Aayurveda consi-

ders that the circulation of Free Protoplasm or Plasma, which is the nearest interpretation of the nutrients called 'Thridhaatu' is far more important than the circulation of blood. Any alteration in its condition alters the condition of health and disease in the human body. The Thri-Dhaatu circulation commences from the alimentary canal and reaches the farthest end of the living tissue system.

To-day, I wanted to demonstrate to you some of the wonderful feats that a Yogi can perform in order to show the extraordinary relation between the nervous and the muscular systems in the human body and the importance which the Yogis attach to the action of Vaayu. These show that we have to revise many of our ideas of the structure and functions of the human organs and tissues as described in the modern physiology. The Yogi can suck into his bladder not only air with which he can blow a bugle when the air goes in and out, but, he can also draw into the bladder water, milk and even mercury at his will. At the All India Aayurvedic Conference held at Lahore, on 29th December, 1942, one, Sri Oruganti Narasimha Yogi demonstrated this. He sucked into his bladder as by a syringe through his penis 40 Tolas of mercury from a cup and ejected it out like urine. You have just now seen me stop the pulse in both hands with ease by the practice of Praanaayaama. These show that our modern physiology is far behind the Yogic system of physiology with which Aayurveda is intimately connected. (Read Chap. on Hathayoga-Section II Vol, I— in the "Text Book of Aayurveda" Edited by me.)

IV. DIAGNOSIS.

IV. Diagnosis :—I say that modern medical men are still infants in the Diagnosis of diseases. An Aayurvedic scientist considers anger, grief and anxiety as causes of certain diseases and he applies a corresponding treatment by creating happiness and other conditions opposite to these as a cure for these diseases. The interpretation of dreams and other mental phenomena in the diagnosis of disease given in Aayurveda are well worth our study.

V. HYGIENE.

V. Hygiene :—The test of the pudding is in the eating. The influence of Aayurveda in preservation of health is demonstated in me. I do not know either mental or bodily fatigue and I attribute this to the benefit that I have derived from the study of Aayurveda. But for this study, I would not have been so strong and sturdy at this age. I challenge every one, young or old to beat me to-day and if it is this that Aayurveda teaches, it is ample proof that the rules of "**Hitaahaara Vihaara**" suitable food and habits enunciated in Aayurveda are an asset to any medical science,

VI. TREATMENT.

VI. Treatment :—It is in the treatment that Aayurveda claims extra-ordinary fineness—For Example :—The use of colour in the treatment of deficiency of colour is worth studying. Colour is taken as such and is digested as such and it appears in the tissues as a colour. It is now known that eating of carrots in excess produces carotinemia, with bright yellow coloration of the blood serum, the palms of the hands and nasolabial folds. The use of fresh indigo, not the artificial one, in the form of the leaves or of the extract was indicated from the Vedic times in the treatment of leucoderma. We use Gorintaaku (Kurantaka) leaf and Manjista as tea or decoctions for the development of certain Bio-Chemical changes in the body as colours. Green oils are used for cooling and red oils for stimulating. In addition to other properties of the oil, the colour has probably some definite therapeutic effect. They have found an equivalent to the human sperm in a vegetable seed and called the plant 'Markata Beeja' (Monkey Seed Plant). We give it for deficiency of sperm and allied diseases. Organo-Therapy has to expand much further to reach the standards set up in Aayurveda. These advances of the positive superiority of Aayurveda over modern medicine are enough to illustrate why we should all study Aayurveda in spite of the great researches that all are already carried on in modern medicine.

NO ANTAGONISM

Fortunately, there is no antagonism in the basic principles between Aayurveda and Allopathy. The theories of circulation, inflammation (Sopha, Paaka, Vrana and Kodha), and microbic infection are common to both of them, but there is only some difference in their view points. Aayurveda considers the maintenance of equilibrium more important than the destruction of the microbe. The treatment is generally conducted by applying the opposite of what is indicated by the symptoms, i. e., either by making up of a deficiency or by reducing an excess.

'Vriddih Samaanaih Sarveshaam,
Vipareetaih Viparyayah'.

The very emblem which the medical profession now wear is symbolical of the spiritual culture of ancient India. It represents the 'Kundalini Sakti', (The coiled Serpent Power), the dormant power that lies in the Chakras and the chains of the sympathetic nervous system on either side. These are represented as serpents, 'ILA' and 'PINGALA'. They are compared to the serpents because their innate power depends upon Praanaayaama, inspiration and expiration of air, just as that of a serpent which is traditionally believed to live on air (Vaayubhakshaka)

I consider that a study of Allopathy is of great help to understand Aayurveda better. I am glad that I had an opportunity of studying Allopathy, but all that knowledge should be considered as 4th form lessons when it is realised what great progress in science has been reached in Aayurveda. Allopathy deals only with the material side of existence but the power of Soul-force is yet unknown to them.

You will now realise how advantageous, it is for every one to study Aayurveda.

THE
THRIDHAATU SIDDHANTA

"*Santatyaa Bhojya Dhaatoonaam*
Parivrittistu Chakravat." ❖
Charaka Chikitsa 15—21.

CHAPTER II.

[COETENTS :—Thri Dhaatu and Thri-Doshas - The Thirteen Deha Dhaatus - Body, Mind and Soul - The four states of consciousness - The Thri-Dhaatus in their gross state - The Three Vipaakas or Stages of digestion - The Thri-dhaatus are Dravyas, materials - The Seats and Qualities of Thri-Dhaatus - Kaviraj Jogendranath Sen's views - Kaviraj Gananath Sen's views - The physical properties of Thri-Dhaatus Tabulated - The circulation of Thri-Dhaatus-Vaata, Pitta and Kapha Temperaments- General Remarks.]

THRI-DHAATUS AND THRI-DOSHAS.

The Thri-Dhaatu Siddhaanta is a demonstrated truth and an established conclusion of Aayurveda. The so-called humours of the west were no doubt taken from some of the ideas of the Thri-Dhaatu Siddhaanta. The word humour is derived from Sanskrit word Aama (See Webster's Dictionary) meaning wetness (compare humid). These old western ideas were based upon a gross understanding of the Thridhaatus as understood by the westerners at that time. Their forsaking of their Humoural Theory now should not lead to the condemnation of the Thri-Dhaatus. Their translations and understanding being perverted, should not affect our position in

❖ "The circulation of the Nutrients goes on eternally like the motion of a wheel."

any way. The Aayurvedists have studied the Thri-Dhaatu Siddhaanta scientifically and professionally. It is difficult to explain their whole implication in a short address like this.

The Tri-Dhaatus are also called Thri-Doshaas. They are called Thri-Dhaatus in the state of equilibrium when they support the body by supplying the necessary nutrition and energy. Any derangement in their condition causes ill-health. In this deranged condition they are called Tri-Doshaas. But, both these words Thri-Doshas and Tri-Dhaatus are however often used synonymously. We have to understand their meaning according to the context.

THE THIRTEEN DEHA-DHAATUS.

According to Aayurveda, the constituent of the living human body are thirteen. They are called the Thirteen Deha-Dhaatus.

I.—3 Dhaatus—Nutrients.—Vaata, Pitta and Kapha.

II.—7 Dhaatus—Tissues.—1-Rasa—Lymph. 2-Rakta-Blood. 3-Maamsa--Muscle. 4-Medas-Fat. 5. Asthi—Bone. 6-Majja—Marrow and 7-Sukra—Sperm.

III.—3 Malaas—Token Debris—1. Faeces 2. Urine and 3. Sweat. These are the excreta i., e., the metabolic wastes that the body has to get rid off.

The living human body consists of only these thirteen and all other things are included in one or other of these thirteen constituents.

This is the most rational and concise method of division. It is a comprehensive description of the human body as a united whole and it represents 1. The incoming nutrients 2. The stationary tissues and 3. The outgoing malas or debris.

BODY, MIND AND SOUL.

All living beings possess, in addition to the physical body, Chaitanya (Aatma—Soul) and Manas. Chaitanya alone is responsible for conscious reactions. It is the Spirit. It is the intelligent, immaterial and immortal part of man. The physical body or the Panchabhootas are derived from Prakriti which is material and Chaitanya is derived from Purusha (The soul). The Manas is the connecting link. The three Dhaatus are derived by the combination of the Panchabhootas and Chaitanya and are therefore associated only with the living body. The Soul exists not only in human beings but also in all other living creatures but its manifestation is different according to its embodiment.

THE FOUR STATES OF CONSCIOUSNESS,

In fact, according to Indian Philosophy, this Chaitanya exists in four states viz., Sushupti, Swapna, Jaagrata, and Tureeya See Vol. I Sec. 2. Chap 1. Text-Book of Ayurveda.

1. In inorganic substances like metals, (Nirindriya Dravyaas), Chaitanya (The Atomic Soul) exists in the Sushupti or Sleeping State.

2. In plants, it exists, as it were, in the Swapna or dreaming state. They simply eat and live and do not think as animals do.

3. In Jaagrata state i. e. in animal life, the Chaitanya is on a higher scale. In man, it is still higher. He knows that he knows.

4. In a Yogi it is in its highest or Super Conscious State. (Tureeya Avastha).

Thus living and non-living substances are all made of different combination of Panchabhautika substance with Chaitanya in different states of manifestation according to the body or vesture in which it is enclosed.

THE THRI-DHAATUS IN THEIR GROSS STATE.

For purposes of this address, I shall deal only with the first group of the Deha-Dhaatus, namely, Vaata, Pitta and Kapha,

Vaata, Pitta and Kapha, in their gross state are secretions in the alimentary canal. For purposes of understanding the description given below, we have to take the alimentary canal (Maha Srotas) commencing from the mouth and ending at the anus as one cavity or tube and the whole human frame as the body in which this cavity exists. The alimentary canal, though inside, may be considered to be outside the body as it is in fact connected at both ends with the outside i. e., at the mouth and the anus.

The Thri-Dhaatus viz., Vaata, Pitta, and Kapha, are derived at birth through the mother from her food which has all the Shadrasas, six tastes, viz., Madhura (Sweet), Amla (Acid). Lavana (Salt), Tikta (Bitter), Katu (Pungent), and Kashaaya (Astringent). These Thri-Dhaatus are daily replenished from childhood by the food having the same Shadrasas.

THE THREE VIPAAKAAS.

The alimentary canal is sub-divided into three parts, the upper most is Kapha Sthaana, the middle Pitta Sthaana and the lower Vaata Sthaana. The food which enters the alimentary canal as Shadrasas is digested and is converted into the Three Dhaatus by three digestive processes. These three digestive processes are called the three Vipaakaas. The six Rasas are turned into Three Dhaatus by the three Vipaakaas. The Three Dhaatus in turn feed the Sapta Dhaatus and all this process is aided by the different Agnis (Bio-Chemical processes) in the body.

1. As soon as Kapha, secreted in the mouth, comes into contact with starchy food in the mouth, it converts the starch into sugar and thereby Kapha augments itself. One tola of a biscuit increases to about 3 tolas when chewed in the mouth. What is added to the biscuit is Kapha. The Kapha is augmented by the addition of secretions to that portion of the biscuit which is convertable and is converted into Kapha.

2. Pitta is that secretion in the alimentary canal which turns all fatty matter into fatty acids and augments itself.

3. Vaata is that secretion in the alimentary canal which converts into assimilable materials all other food that is convertable into Vaayu.

Thus, the Three Dhaatus which are already in the body enter into the alimentary canal as the three secretions, Kapha, Pitta and Vaata respectively when they are hungry, i. e., when they are in a comparatively reduced state; they augment or replenish themselves when food is placed in the alimentary canal. Having thus replenished themselves, they feed the seven Dhaatus or the tissues of the body.

Aayurveda says that there are thirteen constituents of the body, the three nutrient Dhaatus, the seven stationary Dhaatus and the three excretary Dhaatus. The first three nutrient Dhaatus are such as can come out of the body into the alimentary canal [in fact, in a way it is outside]. They come out into the ailmentary canal as secretions ordinarily in order to assimilate food and extra-ordinarily when some drugs such as emetics and purgetives are administered and also in disease [they come out into the alimentary canal] in order to throw out any foreign material. When they come out to take food, they gather such of the materials from the food as are suitable for assimilation into each of them. They thus augment themselves and enter the body again. Allopathy says that it is the food that is digested. Aayurveda says that it is the Thri-Dhaatus that go out of the body to be nourished by the Shadrasaas of the food and that they re-enter the body after being thus replenished during their stay in the alimentary canal.

The same fact can be described in different words. A man takes a pound of milk mixed with an ounce of sugar. We may as well say that he took sugar diluted with milk. Similarly the Three Dhaatus are augmented or diluted at the time of each feeding by the addition of the Anna Rasa or extract of the food.

In this gross state in the alimentary canal the Thri. dhaatus are measurable. They occupy certain amount of space. They have certain weight. The Kapha is estimated to be 7 Anjalis (about 84 ounces) and Pitta to be 6 Anjalis (about 72 ounces). Vaata has no compact form and so its quantity cannot be easily determined. Thus, these three Thri-dhaatus are Dravyas, substances or Matter, but live matter.

Each of the Three Dhaatus, Vaata, Pitta and Kapha although pervading through the whole body, are described as having five divisions or departments, with different seats and functions.

Dhaatu.	Seat.
KAPHA	
Kledaka	Mouth and Stomach [Aamaasaya.]
Avalambaka	Thorax.
Bodhaka	Mouth.
Tarpaka	Head.
Sleshaka	Joints.
PITTA	
Paachaka	Between Aamaasaya and Pakvaasaya.
Ranjaka	Liver and Spleen.
Saadhaka	Heart.
Aalochaka	Inside the pupil of the Eye— Retina.
Bhraajaka	Skin.
VAATA	
Praana	Head, Neck and Chest.
Udaana	Chest, Neck and upper— [abdomen.
Samaana	Umbilical region.
Vyaana	Heart and Whole Body.
Apaana	Pelvis and below.

Anything that has qualities [gunas] is a Dravya. Vaata, Pitta and Kapha are identified by certain Gunas or qualities

and so they are classed as Dravya-matter, living matter according to this science.

I. The Characteristics or gunas of Vaata are :—

1. Dryness. (Rooksha), 2. Lightness. (Laghu), 3. Seetha, (Cold), 4. Kharah (Rough,) 5. Sookshma. (Subtle- Invisible), 6. Chalah, (Motile.)

Tathra Rooksho Laghus Seethah

Kharas Sukkshmas Chalo Anilah, (*Vagbhata Bk. 1 Ch. I*).

The taste is astringent and colour light red (Aruna), Vaata is also called Vaayu.

II. The Characteristics of Pitta are :—

I. (Sa) Sneha- Slight Viscidity, 2. Teekshna- Activity 3. Ushna- Heat, 4. Laghu- Light, 5. Visrum- Slightly foul smelling like blood, 6. Saram-Quickly penetrating 7. Dravam-Liquid.

Pitta is of the nature of heat, slightly viscid but quickly penetrating, and of a colour other than white and faint red. It may be of any colour varying between blue in an immature condition and yellow when mature.

Pittham sasneha teekshnoshnum
Laghu visram saram dravam.

III. Kapha is also called Sleshma. Its properties are :—

I. Snigdhah (Viscid), 2. Seeta (Cold), 3. Guruh (Heavy), 4. Mandah (Slow), 5. Slakshna (Soft), 6. Mrutsnah (Slimy), 7. Sthirah (Motionless).

The taste is sweet. In immature condition, it is saltish.

Snigdhah seeto gurur mandah
Slakshno mrutsnah sthirah kaphah (*Vaagbhata I. 1-11.*)

KAVIRAJ JOGINDRANATH SEN'S VIEWS.

"The Thri-Doshas have two forms, one gross or material and the other subtle (fine). In the subtle state, they are known only by their action. These Thri-Doshaas are rendered ordinarily into English as wind, bile and phlegm.

These renderings have rather helped us to mis-understand and not to understand them well. These three are, in the subtle state, recognised by groups of symptoms, which are percieved in healthy persons as well as in unhealthy persons. We may have given them other names. For example, there is the term X-Ray. What does X mean? It does not mean anything. It is only a name. We might have called it A. B. C, or X, Y, or Z.

But the names Vaata, Pitta and Kapha have a definite meaning. Vaata is derived from the root Va. The word Bios which means life is also derived from the same root, (Va—to move, the letter V is changed into B). Pitta is so called because of its association with heat (Tap-to heat; Tap is inverted into Pit), and Sleshma from its property of joining together (Slesh—to cling together.)

x x x

For example, when a person feels his body too light or feels reeling sensation or pain in a joint, we say that he suffers from Vaayu. When he feels heavy (say heaviness of body or head), these are symptoms of Kapha. When there is a burning sensation in the body and the eyes become yellowish, these are the symptoms of Pitta. Vaayu is said to be light red, Pitta yellowish and Kapha white. They (the subtle Thri-Doshas) are not perceptable things. We cannot see them except by their effects. When a particular person gets his body whitish somewhere, or if he feels heaviness, we ascribe it to something else, which we call by the name Sleshma. So is the case with Vaayu and Pitta. Though we cannot percieve them directly by our senses, we infer their existence. We see that a person's eyes; become yellowish and we call it Pitta-Vriddhi–increase of Pitta; then we give him drugs that act as antidotes to Pitta-Vriddhi, and we often find a cure.

Similar is the case with Vaayu and Kapha. These are not diseases themselves. They are only symptoms of diseased conditions. They have helped us in simplifying our diagnosis of diseases. Vaayu, Pitta and Kapha may exist by themselves or in combinations as Vaayu Pitta, Vaayu Kapha or

Pitta Kapha or all the three together. These combinations have been divided according to gradations into 63 classes.

If we are to ascribe a name for every disease and every symptom, we may become tired of these things and there may not be any unity in our treatment or in the choice of our drugs. The Thri-dosha Theory has acquired a great reputation and if the Allopathic Doctors approach this Thri-dosha Theory, with some amount of Bhakti, (Devotion-Care), they will soon find a culture in it, provided they are open minded enough to adopt it."—Madras address

Vaidyaratna Kaviraj Jogindranath Sen of Calcutta in his Colombo address [1924] described Thri-Doshas as follows.

Vaata is the most important of the three. It is the source of all inspiration, energy, voluntary movements and actions including speech, proper circulation of blood etc., and internal purification of the system.

Pitta is the source of all internal heat including digestion, hunger, thirst, intelligence, memory etc.

Kapha is responsible for the smoothness of the body, general strength, potency, forbearance etc.

When in this Triad, Vaata is predominant, emaciation, darkness of complexion, desire for heat, tremor, flatulence, constipation, loss of strength, and sleep-lessness and loss of sense-activity, delirium, giddiness and exhaustion are the result.

The symptoms of the predominance of Pitta are yellowness of stool, urine, eyes and skin, hunger, thirst, burning sensation and loss of sleep.

While those due to the supremacy of Kapha are anorexia, excretion of mucus, want of energy, heaviness and pallor of the body, low temperature, feebleness of joints, heaviness in breathing, cough and excess of sleep.

It is evident from these, that the words Vaata, Pitta and Kapha do not mean the ordinary wind, bile and phlegm as

was generally supposed. If it is not possible to identify them from the European standpoint, that is because the Western scholars have never considered the human body from our point of view. According to Aayurveda, the aim of all medical treatment is only the restoration or maintenance of the equilibrium of these three Doshas or Dhaatus."

"*Dhaatusaamya kriyaa proktaa,*
Tantrasyaasya prayojanam" (*Charaka I. 1. 53*).

KAVIRAJ GANANATH SEN'S VIEWS.

The following extracts are taken from an un-published lecture delivered at Madras (1930) by Mahamahopadhaya Kaviraj Gananath Sen, M. A., L. M. & S., Calcutta.

The Thridoshas as you see are not merely groups of symptoms. They represent definite Biological processes that take place in a living body. The difference between a living body and a dead body is due to the existence of Thridosha in the living and its absence in the dead. Both the dead and living body are otherwise made of Panchabhutaas. Life is defined in Aayurveda by the union of Body, and Soul. We are told that Rooksha and Laghu etc., are the properties of Vaayu. If Vaayu means air, this Vaayu in this room is not always Rooksha, Seetha or Khara. The air can have different properties in different places. We do not find the air in our body circulating as in a room like this, by the turning of the electric fan. This external air cannot satisfy the discriptions attributed to Vaayu in Aayurveda. What then is Vaayu? Good many of you, at least, realise that the Rishis were not mad men. They conceived a higer force.

"*Utsaaha Utchwaasa Niswaasa*
Cheshtaa Vegapravartanaih
Samyak gatyaa cha Dhaatoonaam
Akshaanaam Paatavenacha". (*Vaagbhata Ch. II. 1.*)

Vaayu has its special functions of creating enthusiasm, of regulating inhalation and exhalation, of supervising the actions of speech, mind and body, of the proper direction of

one Dhaatu into the next nourishing Dhaatu and of the proper evacuation of all excretory matters. Vaayu has these functions. Vaayu is Tantra Yantra Dharah. Tantra is the human body. Yantra is the machinery. Yantra Dhaarana relates to its actions. Vaayu is the custodian of all the viscera and all their actions. Outside the human body, it is the power that regulates the movements of the Sun, the Planets and other heavenly bodies. It is Vaayu which makes the Earth quiver and which is responsible for the production of gold and other minerals in the bowels of the earth. It is certain that Vaayu is not merely the atmospheric air. It is the Almighty Power.

WHAT IS VAAYU ?

The actions of Vaayu in the human body are divided into five headings as :—

Praana, Apaana, Vyaana, Udaana, Samaana.

That is to say, Vaayu regulates the different functions in different manners. It induces the different kinds of muscular action. It regulates the function of the mind, regulates the Will (Kriya Sakti), feeling (Iccha Sakti) and Understanding (Gnaana Sakti), it enlivens all the senses, it carries to the proper destination all the Indriyaardhas—Shabda, Sparsa, Roopa, Rasa and Gandha. It produces the co-hesion of the different systems. When there is a breach, it builds tiny cells to fill up that breach. It joins the skin, when an incision is made. I do not propose to state everything in detail. There are some other things higher than nerve force. In the life of the embryo, Vaayu differentiates and supervises the division of cells and tissue formation. All the different viscera and organs are made by the influence of Vaayu and as long as life lasts—Vaayu lasts and regulates every function from the first cell to the well developed body. Every bit of it is produced in Vaayu. What is Vaayu? Vaayu is the vital force. Nerve forces are produced from Will. Vaayu is the master of the Will. *

(*Mahamahopaadhyaya Kaviraj Gananaath Sen, was one of the Judges at the Thri-dosha Parishat held subsequently (1935)

at Benares; he changed his opinion and agreed that Vaayu is not a force, but that it is a Dravya (matter) of which the force is a Guna or quality. Vaayu is the meterial which is responsible for the generation of the vital force. Vaayu is not itself the vital force" A. L.)

5. " *Sakter dravyaadhishtitatvena*
Swatantraavasthityabhaavaat
Vaataadeenaam na soktitwam
Kintu dravyatwam eva".

ACTION OF PITTA

About Pitta: we find that Aayurvedists have Pitta and Kapha Doshaas in two forms. They say that Kapha and Pitta can be divided into Prasaada and Mala. When there is a derangement of these three (forces), you get the manifestations of these in the form of excretions, which are called malas. Mala Bhoota Pitta as we understand from Western Physiology is an excretion, that is passed out of the system. We have been taught that bile is essential for digestion.

"Only this morning, I saw a medical man having a biliary fistula, which is the result of an opening made by a surgeon. He is in excellent health and is aged 20 to 25. (Only) his face is white. You will find in this case that the Pitta of bile is excreted out of the body through the fistula in the skin connecting it with the gall bladder. The stools and urine were examined, both are free from bile.

The bile which is excreted is not so easential as we are apt to think. It also produces Toxaemia, if it is absorbed into the system. If this liver, after manufacturing this excretion does not throw it out, one gets jaundice, fever etc., This is Toxæmia. So long as, it is excreted into the intestines or outside, the patient fares well. That shows that this is Mala Bhootha Pitta."

There is another Pitta, fine Pitta, which in the fine or Prasaada state influences the digestive processes. In the spleen and the liver the Prasada Bootha Pitha manufactures Ranjaka Pitta that forms the red colour of the blood. We

all know that the red colour of blood is associated with Haemoglobin.

Another function of Pitta is in the Retina. This is called Aalochaka Pitta. That forms the Photo Chemical substance of the eye.

The glow of one's complexion is also due to Pitta.

The Kshaya or Virddhi, the decrease or increase of any of these Doshaas are causes of diseases. When Pitta is deranged the Mala Bootha Pitta or excretory Pitta is also deranged. It exceeds in quantity or is less. Its biochemical properties are also altered. This produces the Toxaemia.

ACTION OF KAPHA

Next take Kapha : Kapha is sticky and smooth. When you find Kapha as Prasada, your tongue remains moist, your mucous surfaces remain moist. The Prasaada Bootha Kapha functions by creating the secretions, the saliva, the synovial fluid and so forth.

What is upset when Kapha is vitiated ? Prasaada Bootha Kapha is deranged. There is excess of secretions and there is Catarrh—cold in the nose. At once, we find general heaviness of the body, the malas begin to excrete profusely and we get evidences of heaviness in the head, stiffness in joints and in all other places. These are due to deranged Kapha.

Whereas Vaayu is always Sookshma—Subtle-invisible, the other two have both sthoola (Gross-visible) and subtle forms.

The subject is too vast. It will take 20 lectures to cover the whole field.

PHYSICAL PROPERTIES OF THRI-DHAATUS TABULATED.

The physical properties of Vaayu, Pitta and Kapha are tabulated below :—

	Vaayu.	Pitta.	Kapha.
General	Dry,	Slightly Viscid.	Viscid.
	Expanding.	Flowing.	Motionless.
	Non-Sticky.	Non-Sticky.	Sticky, Slimy.
	Light.	—	Heavy.
	Cold. (in action)	Hot (in action and in touch)	Cold (in-action and in touch)
	Penetrative	Active	Inert.
	Rough	—	Soft.
	Rajas. (*Predominating*)	Sattwa. (*Predominating*)	Tamas. (*Pradominating*)
Taste	Astringent	Bitter	Sweet
Smell	—	of raw meat	—
Colour	Light-Red (Aruna)	Red, yellow etc , except white and light Red.	White
Normal quantity	—	5. Anjalis (60 ozs.)	6 Anjalis (72 ozs.)

[*Charaka Saareera 7—20*]

THE CIRCULATION OF THRI-DHAATUS

Modern physiologists attach great importance to the circulation of blood. Although Aayurvedists knew about the circulation of blood they considered that the circulation of Rasadhaatu (lymph) was considered more important because Rasadhaatu is the immediate vehicle of Thridhaatus which represent all the nutrients required by the body, Rasa Dhaatu starts with the lacteals loaded with Thri-dhaatus from alimentary canal and entering the heart through the thoracic duct, it acquires the red colour when it comes in contact with Ranjaka Pitta derived from the liver and

the spleen and is turned into blood. After nourishing all the successive dhaatus, the Rasa dhaatu is finally converted into Ojas. It is the Ojas that in fact is responsible for all the vitality, strength, lustre and the very existence of life in the body. This cycle of circulation of nutrients goes on continuously like the motion of a wheel.

"Parivrittisthu chakravat". (Charaka VI. 15, 21.)

These nutrients travel in the arteries as far as the capillaries go and then they ooze out into the subcutaneous or other tissues beyond the capillaries.

According to Aayurveda the heart is the Sthaana, seat of Rasa also.

"Tasya [Rasasya] cha Hridayam Sthaanam" Sus: I. 14—3

From the heart, the Rasa-rakta mixture enters the Dhamanis (here blood vessels) and travels in all directions. This continuously circulating throughout the body (Kritsnam Sareeram), it does the functions of Tarpana (providing everything that is necessary for the tissues), Vardhana (making them grow), Dhaarana (supporting them) and Yaapana (making the body continue its existence). Susruta says (Soo. Cha. 14) that it does all this for reasons that we do not know (Adrishta hetukena). Why the Rasadhaatu does all this in inexplicable. That means, it is its nature—Swabhaava.

When these three Dhaatus flow freely without any obstruction and when all the Agnis, Dhaatus, Malas, Indriyaas and Mind are fed properly and when they do their work properly, the condition is defined as health. (Swasta)

But when the Doshaas, are deranged and an obstruction is caused to their free movement, disease commences just as rain develops from the clouds when there is any obstruction to their movements and when conditions favourable for the formation of the drops of rain are satisfied.

" Kupitaanam hi doshaanaam sareereparidhaavataam
Yatra sangah swa vaigunyaad vyaadhih
stathropa jaayate".

[*Sus, Soo. Ch. 24. V. 10-Charaka Chikitsa 15—36-37.*]

The Thri-Dhaatus being the feeders of Rasa-dhaatu and all the other Dhaatus, they have even more extensive circulation than the Rasa Dhaatu. They (Thri-Dhaatus) start from within the alimentary canal—Mahaasrotas and after feeding themselves there to their satisfaction (Paripushta Thri-dhaatu), they enter the lymphtic circulation through the lacteals leading from the alimentary canal and empty themselves into the Thoracic duct. They get mixed up with the blood in the heart and circulate through the arteries, capillaries, lymphatics, cells, tissues and organs, get diminished (undergo Soshanam) and go back to the alimentary canal to be replenished or fed again.

Thri-dhaatus together may be described as in-going organised protoplasmic nutrient material in the circulation.

The Thri-Dhaatus may be said to be free protoplasm or plasma, the liquid part of blood and lymph. It is the simplest form of organized matter, in the vegetable and animal body out of which the several tissues are formed and also nourished. It is the nearly colourless fluid in which the cells are suspended.

This nutrient material feeds the several stationary tissues and cells, such as corpuscles in the blood, connective tissue cells, muscle cells, fat cells, bone cells, marrow cells, nerve cells and germ cells thus forming the higher and higher structures.

There is no living tissue or any space in the body which is not penetrated by the Thri-Dhaatus.

"*Vaata Pitta Slekshmaanaam punah,*
Sarva Sareera Charaanaam,
Sarvaani Srotaamsi ayana bhootaani."

(*Charaka-Vimaana V. 5.*)

"Vaata, Pitta and Kapha move through all the ducts in the body and they are present in every part of the body."

Thus the circulation of the Tri Dhaatus is more extensive than the circulation of lymph and blood.

VAATHA, PITTHA AND KAPHA TEMPERAMENTS.

The temperaments of individuals are according to Aayurveda, attributed to heridity and the environments of the fertilised ovum. The child is influenced by evolutionary changes due to time (Kaala), the conditions of fertilization, the growth in the uterus, the food and habits of the mother and also by the constituent elements that make up the embryo, namely, the Pancha Bhutaas and Aatma which carries with it the relative preponderance of Vaata, Pitta and Kapha temperaments as Poorva' Karma. These congenital tendencies are also classified into Vaata, Pitta and Kapha and combinations of these three temperaments. They are called three Prakritis of man.

KAPHA TEMPERAMENT.

People with Kapha temeperament have a full and well nourished, oily, smooth, delicate and beautiful body with strong compact and steadly limbs. They have profuse, black hair. They are rather slow in taking food and in their habits and actions. They are steady in the gait and are less effected by hunger, thirst, heat and sweat. They have a clear voice and complexion. They are generally well educated, comparatively rich, strong and vigorous in sex life. They are generally calm and live a long life. Susruta considers that their temperament resembles that of a lion, horse, elephant, cow, bull, eagel or swan.

PITTA TEMPERAMENT

Those with Pttta temperament cannot generally endure heat. They are easily susceptible to hunger and thirst, and have a tendency to the hair getting prematurely grey, to wrinkled skin or bald head. They may have also soft, delicate hair of a dull yellowish colour (Kapila) and moustache. They have keen appetite, eat well. They are generally very courageous and irresistible in battle, but they cannot endure much hardship. The muscles and joints are rather unsteady and loose. There may be a disagreeable smell in the armpits, mouth, head and skin. There are less virile. They are moderate in strength, general or scientific knowledge and also in their means of livelihood. Susruta

says that their nature seems to resemble that of a serpent, owl, cat, monkey, tiger, bear or mangoose.

VAATA TEMPERAMENT.

People with Vaata temperament generally have their skin rough and dry and their bodies slender, have their voice rather low and indistinct. They do not have good sleep. They are talkative. They are quick to start any venture and suffer from a lot of worries. They are prone to fear, to be quick in love or hatred. They are quick in grasping things, but are also quick in forgetting. They cannot withstand cold, shivering or fits. The hair, moustache, nails, teeth, face, hands, feet and limbs are rough, brittle and easily cracking. The joints are creaky. Morally, they tend to be dishonest, jealous and thievish. They are generally weak, have less children and they are not flourishing either in health or wealth, because they are incapable of accumulating money.

According to Susruta, their nature seems to resemble that of a goat, jackal, hare, rat, camel, dog, vulture, crow or ass. (Susruta-Sareera Ch. 4.)

If these qualities are overlaping and mixed up, they are called mixed temperaments, Prakritis. Samaprakriti is a harmonious combination of Vaata Pitta and Kapha temperaments. Those who have a particular Prakriti are easily susceptible to diseases having similar symptoms. The Prakriti or temperament also of each individual is therefore to be studied before any diagnosis or treatment is effected.

GENERAL REMARKS.

The difference between the Western System of Medicine and the Aayurvedic System is primarily in the Tridosha Siddhaanta. The three Doshaas have got a significance of their own.

1. To the man in the street.

2. To the village physician, who does not know the subtle theories of Aayurveda but who only knows the formulae and the methods of applying them.

3. To the Aayurvedic Scholar and Scientist, who knows the real significance of the fundamentals of Aayurveda, their

they are derived from the five states of matter, technically termed Pancha Bhutas and Chaitanya and that every detail in the structure (Dravya), properties (Guna) and action (Karma), of time, food and drugs etc., can be explained scientifically by the application of Thridosha Siddhaanta.

4. and to the Yogi, who knows, theoretically and practically, the actual processes of life and who can control them at his will by his Super-normal powers.

THE VILLAGE PHYSICIAN

As far as the practice of medicine is concerned, the words Vaata, Pitta and Kapha stand out in clinical work as mile stones or sign posts on a high road, directing the physician towards easy diagonisis of the disease and in the appropriate administration of medicines, suitable to the diseased conditions. The Village Physician—the moment he finds, definite symptoms such as acute pain, shivering, dryness of tongue or skin or any inability of action, or loss of function or fits—he would put it down to be a derangement of the Vaata Type. If there is burning sensation all over and simultaneously, green or yellowish colour, bitter taste, biliousness etc, or high fever, he knows that it is of the Pitta type. If on the contrary one finds heaviness, dullness and low fever, excess of secretion in the mouth and loss of appetite, they are clear symptoms of the Kapha type. But this is not all. The diseases are to be studied as such also according to the part of the body or organ affected, the age, the season, the strength of the patient and of the disease, the condition oi digestion, the temperament and habits, in all their details and their stages should be carefully noted. (Vaagbhata, I. 12—67.)

The three doshas clinically are something like three big pegion holes in the mail-sorting office, where the letters with different destinations are sorted out into three or four pegion holes according as they belong to the North, South, East and West. The symptoms of diseases, which are multifarous are synthesised into three groups and their combinations, which are easily recognised by the trained Ayurvedic physician.

Just as in a political election, one could know the party to which the condidate belonged by his flag and one could at once understand the fundamentals of the policy for which one was voting without knowing exactly the qualifications of the condidate himself, the physician, who can recognise the delicate conditions of Vaata, Pitta and Kapha, does not easily go wrong even in case he fails to note other details of the disease. He has only to apply the treatment opposite to the symptom exhibited by the doshas. The best Anti-vaata treatment is an enema. The best Anti-pitta treatment is a purgative. The best Anti-kapha treatment is an emetic. Not to speak of all the drugs of the Pharmacopea, out of all the vehicles of medicines used in treatment, castor oil is best for Vaayu, ghee for Pitta and honey for Kapha. Then again, a hot or warm binder is best for Vaata because Vaata has properties of motion and is cold in action. For Pitta, a cold sponge, a loose covering and cool ghee as an external application suit best; and for Kapha, hot fomentations with dry substances like heated sand and hard and dry massage may be safely indicated.

In order that the functions of Vaata, Pitta and Kapha may be understood by a beginner, the human body may be compared to a motor-car which runs on petrol.

1. The sparking system with all its wires is like the nervous system and the electric current which produces the spark may be compared to the bio-motor force exhibited by Vaayu. Vaayu generates the Kriyaa-Sakti as one of its qualities. Kriyaasakti is the power which makes the living cells do their work. Kriyaasakti is the cell force. In the human body, there is the Soul which may be said to correspond to the motor driver, who operates and controls the machine. Switching the motor is similar to making contact of the Sonl with the body through the application of the mind.

2. The combustion of the petrol may be compared to the metabolism which is attributed to PItta.

3. And thirdly, the machanism of the cooling and lubricating systems is analogous to that of Kapha.

In fact, outside the human body the functions of Vaayu, Pitta and Kapha are respectively similar to those of atmospheric air, with its mighty power of diffusion, the Sun-as the source of heat, and the Moon as symbolical of cold and water.

When Pitta is in excess, it is like a house on fire, quick cooling treatment is indicated such as hydrotherapy with ice and wet pack. When Kapha is in excess, it is like a field suffering from inundation; drainage and drying up by heat and dry air are indicated. Pitta and Kapha are said to be by themselves inaffective (lame) until they are influenced by Vaayu—the sole leader. When Vaayu joins Pitta, the Pitta symptoms are aggravated and when Vaayu joins Kapha, the Kapha symptoms are exaggerated. When Vaayu is in excess there is over activity of the tissues. Convulsions and affections of the mind such as hysteria are attributed to the excited Vaayu. When Vaayu is less, the symptoms will be such as are found in loss of function, paralysis and neuresthenia.

These examples are given only to serve as illustrations of the types into which certain symptoms may be grouped, but, as has been said above, the subject has to be studied, in great detail, if one has to understand all the delicate processes of life. This is the real scope of Aayurveda. Literally, Aayurveda is the Science of life—Aayuh Life, and Vid to know: that is to know (1) the duration of life, (2) the conditions, which are conducive to the happiness or misery in life (here and hereafter) and to its longer or shorter duration (3) the utility of the individual to the Society (Hita) or otherwise (Ahita) and also (4) the methods for securing this healthy, happy, long and useful life.

Hithaa Hitham Sukham Dukham,
Aayuh Tasya Hithaahitham,
Maanam cha Thacha Yatroktam,
Aayurvedah Ssa Uchyate.

CONCLUSIONS.

The three Dhaatus Vaata, Pitta and Kapha considered severally have to be understood as follows:—

THRI-DHAATUS CONSIDERED PHYSICALLY.

1. Physically :— They represent the three states of matter, the solids, liquids and gases roughly corresponding to Kapha, Pitta and Vaata respectively. Kapha is predominantly solid, Pitta predominantly liquid and Vaata is predominantly gaseous (an aeriform fluild). It has the property of expanding in all directions. Agni and Aakasa states, which are not recognised, as yet, as subtle states of matter by the West are also predominant in Pitta and Vaata respectively.

All states of matter are ralative. Liquid water becomes solid when converted into ice; and it become a gas when converted into vapour. Pitta is a liquid with a tendency to continue to be a liquid. Kapha may also be considered to be a liquid, but with a tendency to solidify and Vaata may also be considered to be a fluid with a tendency to further liquify or evaporate and it therefore ordinarily exists in the gaseous state. A fluid is anything that flows. At this rate air is a fluid; electricity that flows along a wire is also a fluid, so also, Vaata in the human body is a fluid of a peculiar type. The different states of matter are difficult for us to comprehend in their subtle conditions even with the aid of the most delicate intruments. A yogi however knows even the most subtle of things and he can also alter one state of matter into another by virtue of his supernormal powers. The control of Vaayu is therefore easy for a yogi. Refer to Section on Darsanas in my Text-Book of Aayurveda.

BIOCHEMICALLY.

2. Bio-Chemically, the three doshaas surround and penetrate the cells and tissues in the form of nutrients and supply them with all food consisting of the solids, liquids and gases in the shape of substances ingested by the cells and tissues

The three Doshaas together may be taken as constituting the plasma or free protoplasm which feeds all cells that go to form the tissues.

The three Dhaatus have each its own constitution in the gross and the subtle state.

I. Kapha in the mouth is a secretion which is alkaline, into which is assimilated most of the starch or other food having a predominantly Madhura (sweet) and Lavana (salt) taste. It is semi-solid and is full of mucus. Its primary source is in the Aamasayaa (i.e.) in the mouth and the upper portion of the stomach. See Madhura Vipaaka P. 10.

II. Pitta in the gross state is acid. It is semi-liquid, more liquid than solid. It is a secretion into which most of the food having Amla (acid) taste is assimilated. Its primary seat is the portion of the lower stomach and duodenum i. e. Pachya-maanaasaya. See Amla Vipaaka P. 11.

III. Vaayu in the gross state in the alimentary canal is also a secretion which has a bitter taste and is a volatile fluid into which most of the food having Katu (Pungent) and Tikta (Bitter) and Kashaaya (Astingent) taste is assimilated. Its primary seat is Pakvaasaya (Intestines). See Katu Vipaaka P. 11.

PHYSIOLOGICALLY.

3. The Thridoshas, Vaata, Pitta and Kapha function as responsible primarily for all the activities of the Nervous, Circulatory and Lymphatic systems respectively of the body.

PSYCHOLOGICALLY.

4. The Vaata, Pitta and Kapha form the physical counter parts of all the conditions that are responsible for the different mental states. The Thri-Doshaas are derived from the Thri-Gunas as everything in this world. There is an increase of Vaata in grief or worry. There is an increase of Pitta in wrath or anger. There is an increase of Kapha in depression. The state of equilibrium of Satva, Rajas and Tamas is responsible for a state of perfect health of the Indriyaas. Normal Vaata is responsible for enthusiasm. Normal Pitta is responsible for intellect and memory. Norma Kapha is responsible for strength and courage.

PATHOLOGICALLY.

5. Pathologically:—Vaata, Pitta and Kapha become harmful when they are deranged (Kupita). They cause functional derangement first and organic changes **(Dhaatu Paaka)** when the derangement continues. Vaata, Pitta, and Kapha in the form of normal excretions constitute part of the Malas, or debris. Flatus is the mala of Vaata, Bile is the mala of Pitta and Phlegm is the mala of Kapha. Besides these three token malas, there are malas of the Sapta Dhaatus. The malas in the Prasaada state however, promote health and in only a deranged state they cause disease. In the Prasaada state they help to support the body and to that extent they are also called Dhaatus.

CLINICALLY.

6. Clinically :—the three Doshas represent certain groups of symptoms, which serve as sign posts indicating the types of diseases and the different stages in the same type. Such grouping or classification helps the physician greatly in treatment. There is no pain without derangement of Vaata. There is no burning sensation or Paaka—inflammation—without derangement of Pitta and there is no pus without derangement of Kapha. Medically, derangement of Kapha indicates heaviness and increase of Kledam, (moisture). Predominance of nervous symptoms denotes Vaata type, hyperpyrexia and acuteness of symptoms indicate Pitta type and a mild onset generally indicates Kapha type. The cerebral type is generally due to derangement of Vaata, the abdominal type is generslly due to Pitta derangement and respiratory type is generally due to Kapha derangement. But, if fever is also present, it indicates the derangement of both Pitta and Kapha and when the nervous symptoms are also present, it is of a mixed or Sannipaata type in which there is a serious derangement of all the three doshas. These divisions go up to 63 sub-types by combinations of the 3 doshas. The physician has to decide which is primary and which is secondary.

The importance of knowing the chief seats of Vaata, Pitta and Kapha and their subordinate seats lies in its utility in treatment.

When Vaata is deranged any where in the body, it is necessary to devote our special attention to the treatment of Vaata at its principal seat in the intestines (i. e.,) Pakvaasaya, by suitable enemas. Just as, a tree dies when its root is cut off, so also, vaata in other places will be subdued, when its virulence is attacked at its root, (Moola) in the pelvic area.

Similarly, when Pitta is deranged anywhere, we direct our attention to its chief seat in the Pachyamaanaasaya and treat it with purgatives so that the other Pittas, fed by the main source, may be starved out. So, also in Kapha derangement, we have to attack it at its source in the Kapha-Sthaana, i. e., in the Aamaasaya. Of course, treatment of the subordinate doshaas in their places is also indicated according to the various stages of the disease.

A CONSTANT ATTEMPT AT SYNTHESIS.

A true scientist would wait and think whether a study of the Thridoshas can give any special point of view peculiar to the science of Aayurveda, which would help in the diagnosis and treatment of diseases. In Aayurveda, there is a constant attempt at synthesis of the various items of knowledge so as to bring all conditions of health and disease into the Three-fold formula of Vaata, Pitta and Kapha. In the western Sciences, the tendency is to greater and greater analysis, whereby the number of diseases are multiplied with every new discovery. According to Aayurveda every new discovery helps us only to understand the Thri-dosha Siddhaanta better by discovering unity in multiplicity. In fact *ill-health* is caused by derangement of the three Doshas and *health* is restored by bringing the deranged three Doshaas to their normal condition.

I would ask you to study Aayurveda not because it is your own pet science which has descended to you from your ancestors, but because it is superior to the Western medical science in many respects. Though Aayurveda is primarily a material science, it is, at the same time, the best guide to Philosophical studies. Culturally Aayurveda holds a high place amongst the world's Sciences.

CHAPTER III

The
TRIDOSHA THEORY

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[Contents :—The Three Dosha Theory—The Methcd of Study—Thirteen Constituents of Human Body—Vaayu—Pitta—Kapha—Comparison with Motar Car—Summary.]

THE METHOD OF STUDY

An attempt has been made to establish the basis of the *Tridosha* Theory which, again, in its turn, is the basis of the Aayurveda. The method adopted in this study is to collect as much material as possible from the *Samhitas* relating to the functions, normal and abnormal, of *Vaayu*, *Pitta*, and ***Kapha***. *Caraka Samhita* and *Susruta Samhita* have rather exclusively been used for the study, only because these alone represent the conception of *Tridosha* as described by the originators of this theory.

This material which is fairly rich has been scrutinised in order to find whether it can be classified and grouped in any standard and scientific way. The result is remarkable. All this material can be adequately grouped under headings which can explain all the symptoms and functions grouped under each and at the same time agree essentially with the modern physiological doctrine.

The *Tridosha* Theory is thus found to be truly scientific and based on exact science. It is remarkable that good many things visualised by the ***Rishis*** of remote ages have been proved on experimental basis.

The order of study under each head *Vaayu*, *Pitta* and ***Kapha*** has been as follows :—

* Extracts taken from the Journal of the Indian Medical Association Jan. 1943.

(I) Material collected from the *Samhitas.*

(II) Grouping of the above material under appropriate heads.

(III) Arranging these groups according to 5 kinds described in the *Samhitas.*

(IV) Seat of the *Dosha.*

(V) General functions, normal and abnormal, explained.

(VI) Properties of the *Dosha* and the temperament due to preponderence of the *Dosha.*

(VII) Causes of derangement.

13 CONSTITUENTS OF HUMAN BODY

(1) **Dosha Dhaatu Mala Moolam hi Sareeram S. S. 15/3).** †

The human body is composed of 13 constituents, divided into 3 categories: 3 nutrient substances called the **Tridosha. Vaayn, Pitta and Kapha**, 7 supporting tissues called **Dhaatus**, and 3 waste products called **Malas.** Vaayu is that which is responsible for life, Pitta for fire and Kapha for the fluid (cooling elements) of the body as mentioned by Susruta.

(2) Tatra Vaayuraatma Dhaatma, Pitthamaagneya, Sleshmaa Soumya iti (S. S. 42),

The three fundamental functions of the body—(1) movements (Sanchalana) (2) heat production (Swedana) and (3) lubrication (Snehana) are being carried out respectively by *Vaayu*, *Pitta* and *Kapha.*

The function of movement is being carried on by nerve impulses acting mainly through the muscles both voluntary and involuntary. The function of heat production is carried

† In the references from the *Samhitas* the following abbreviations are used. The first letter, S or C indicates Susruta Samhita and Charaka Samhita respectively. The second letter S, C or N indicates Sutrasthanam, Cikitsasthanam and Nidaanasthaanam respectively. The first figure indicates the chapter and the last figure the number of the paragraph.

on by disintegration and metabolism of the food materials inside the body. The functicn of lubrication of the body is carried on by the property of supporting individual cells so as to allow them to perform conjoint action.

It has also been pointed out that when deranged, *Vaayu, Pitta and Kapha* become evident respectively by pain — **Soola** burning sensation - **daaha**, and swelling—**Sodha** as the chief manifestations.

It is sought to explain *Vaayu* as that which is responsible for the nervous impulse conducted through the nerves, aud the nerves as the dead wires which only act as the vehicle. So the nerves themselves are not *Vaayu*, it is the cause of the nerve impulse which is *Vaayu*. A new building may be fitted with the proper wiring system connected to the electric fans, bulbs, radio receiver, refrigerator, etc., but none of these will do the function until the electric supply corporation connect the same with their mains. The building without electric supply but with inside wiring complete may be compared with a dead body with all the nerves intact.

As an electric machine with adequate wiring is inactive without electricity, so also the animal body with all nerves intact but deprived of *Vaayu* is dead. *Vaayu*, like electricity is thus invisible and is revealed only by its effect, *i. e.*, **Avyaktvya Karmaacha.**

It is sought to explain *Pitta* as that which is responsible for the function of all glands of our body, particularly the digestive glands which digest the food making it available for the energy aud heat, *i.e. Agni* of our body.

Kapha represents the body water and the supporting and lubricating systems of our body.

VAAYU

I

According to the order of study stated above, in the first place the materials from the *Samhitas* have been collected, a scrutiny of which presents us with 313 symptoms as manifested by nomal and abnormal *Vaayu*. These are as follows:*

* See Chepter XIII — The five kinds of Vayyu.

(1) The symptoms of abnormal *Vaayu* (C. S. 20/9) = 80 symptoms.

(2) Symptoms of abnormal *Vaayu* according to site of affection (C. C. 8/22-34) = 72 symptoms.

(3) Symptoms due to 5 different kinds of *Vaayu* (C. C. 28/4) = 16 symptoms.

(4) Symptoms of one *Vaayu* covered by the other (C. C. 28/67, 68) = 41 symptoms.

(5) Symptoms of *Vaayu* affections according to site (S. N. 1/21-23) = 36 symbtoms.

(6) Symptoms of abnormal *Vaayu* (C. C. 28/8 = 21 symptoms.

(7) Symptoms of abnormal *Vaayu* (Astanga-S.2146/-47) = 24 symptoms.

(8) Symptoms of abnormal *Vaayu* (C. S. 20/10) = 23 symptoms.

This makes a total of 313 symptoms due to normal and abnormal *Vaayu* as collected from *Samhitas*.

II

The next order of the present study has been to group the above material under appropriate heads. Following this order, it has been found that all these 313 symptoms can be very appropriately classified under 9 groups as follows:—

(1) Symptoms due to normal and abnormal mental functions.

(2) those of special sense organs,

(3) those of circulation, respiration, deglutition,

(4). of excretion,

(5) of digestion,

(6) due to vasomotor system,

(7) those of sensatiou,

(8) those of motor function,

(9) speech,

III

The third order of the study has been to arrange those groups according to 5 kinds of **Vaayu** as described in the **Samhitas.** The attempt has been very successful. The symptoms classified under the first 3 groups (mental, special senses, those of circulation, respiration and deglutition) exactly fit in with manifestation of **Praana Vaayu** as mentioned in the **Samhitas.** Similarly the group 5, i. e. those of digestion are the function of **Samana Vaayu,** the group 4, **i.e.,** those of excretion as of **Apaana Vaayu,** while the groups 6, 7, and 8, **i. e.**, vasomotor symptoms, sensory and motor symptoms as of **Vyaana Vaayu** and finally the group 9, **i.e.**, speech as of **Udaana Vaayu.**

Vaayu thus regulates all the functions of all machines and supporting framework of our body and is so appropriately **called Tantra Yantra dharah.** This comes in close meaning when he consider what Sarngdhara says.

> **Pittah panguh kapah panguh**
> **Pangavo mala dhaatavah,**
> **Vaayunaa yatra neeyantae**
> **Tatra dhaavanti meghavatu,**

PITTA

The same order of study, as mentioned at the beginning has been applied to the study of **Pitta** as well.

I

(1) From the material collected from the **Samhitas** we find the following: **Pitta** produces digestion or indigestion, vision or loss of vision, normal or abnormal temperature of the body, normal or abnormal colour of the body, courage or cowardice, fear or bravery, anger or the reverse, pleasure or displeasure, **Moha** and **amoha**, satisfaction or dissatisfaction. (C-S. 12/15).

Again, digestion, heat production, hunger and thirst, softness of the body, radiancc, cheerfulness, intelligence are the functions of normal **Pitta**. (C–S. 18/43).

Further, colouration, digestion, vitality, strength, intelligence, these are produced by five kinds of **Pitta**(S-S. 18/43).

Again, that **Pitta** which digests all kinds of food materials, separates them into chyle, urine, faeces and supplies therev the essential fire for the nutrition of the body is **Paachaka Pitta**. The **Ranjaka Pitta** imparts red colour to the chyle. The **Saadhaka Pitta** serves to fulfil one's desire. **Aalochaka Pitta** gives the vision. **Bhraajaka Pitta** gives the glow and complexion of the skin. (C. S. 20/9).

The symptoms due to abnormal **Pitta** or 40 in number. (C. S. 20/16). These are : (1) sensation as presence of fire by the side, (2) sensation as in a burn, (3) burning sensation all over body, (4) as in severe burning all over body, (5) as if smoke is coming out of body, (6) acid eructation, (7) burning from acidity, (8) internal burning sensation, (9) in some local area, (10) rise of temperature, (11) excessive perspiration (12) local perspiration, (13) bad odour of body, (14) cracking of local areas (15) suppurative blood, (16) suppurative muscle (17) burning sensation of skin, (18) burning sensation of muscle, (19) cracking of skin and muscle, (20) cracking of inner layers of skin, (21) red patches, (22) haemorrhage, (23) jaundice (green), (24) jaundice (yellow), (25) black spots, (26) cracking of muscle and skin of armpit, (27) jaundice, (28) bitter taste in mouth, (29) bad odour in mouth, (30) excessive thirst, (31) non-satiety after meal, (32–36) suppuration of mouth, throat, eyes, rectum and penis, (37) loss of blood or loss of vitality, (38) loss of vision, (39) green colouration of eyes, urine and stool, (40) yellowish colouration of eyes, urine and stool.

II

(II) In attempting to classify the above material under appropriate heads we find that all of them can be adequately grouped under the following 6 groups.

(*a*) Symptoms due to rise of temperature, perspiration ; (*b*) Symptoms due to secretion of sebum, infective and suppurative processes of the skin ; (*c*) symptoms due to disturbance of digestion ; (*d*) Pigmentation, hæmorrhage and jaundice ; (*e*) courage, fear etc. ; (*f*) Vision.

III

(III) Arranging these groups according to the 5 kinds of **Pitta** as described in the **Samhitas** we find that the groups

(*a*) and (*b*) relate to the **Bhraajaka pitta**; grou (*c*) *i.e.*, digestion **Paachaka pitta**; (*d*) pigmentation etc. **Ranjaka pitta**; (*e*) courage, fear etc. **Saadhaka pitta**; and (*f*) vision **Aalochaka pitta.**

The functions of **Pitta** are in some way related to the functions of the glands of our body, the final outcome of which is to produce heat or energy which is necessary to maintain all functions of our body. It has been explained in the text how digestive glands in the alimentary tract are the seats of **Paachaka pitta** and act as machines to break down the food material to be absorbed in readily utilisable forms.‡

‡ See Chapter XIV—The five kinds of Pitta.

These elementary products of food material supply energy to the whole body, liver being the biggest factory for this purpose. The secretions of sweat and sebaceous glands of the skin, the **Bhraajaka pitta** of our body maintain the constant body temperature and glossy appearance of the body; liver and spleen, the seat of **Ranjaka pitta** regulate the formation, destruction and disposal of red blood cells. The retina and lachrymal glands having the **Aalochaka pitta** regulate vision; and the glands of internal secretion, secreting the **Saadhaka pitta** regulate courage, fear, anger etc,

KAPHA

For the purpose of the study of **Kapha** the following materials are available from the **Samhitas.**

I

Charaka **Samhita—Sutrasthaanam** -- 12/12, 16, 18/40, 44; 20/18.

Susruta **Samhita —Sutrasthaanam**—15/4, 15; 2/12-14.

Instead of quoting all these passages, it will suffice to mention only one—C. S. 20/18 which indicates the 20 symptoms of abnormality of **kapha** which are as follows—(1) Satiety after food, (2) sleepiness, (3) increased sleep, (4) moist condition of the body, (5) feeling of heaviness of the body (6) laziness (7) sweet taste in the mouth, (8) increased fluid in the mouth, (9) bringing out phlegm, (10) excess of excreta, (11) lethergy, (12) feeling of pressure over the chest,

(13) sticky mucus in throat, (14) fullness of vessels, (15) swelling in the front of the neck, (16) general anasarca, (17) indigestion, (18) local oedema, elephantiasis, (19) pale complexion of the whole body, (20) pale colour of the urine, fæces and eyes.

II

The passage of Charaka **Somhita**—C. S. 12/16 gives us a nice clue to classify all the materials referred to above. The heading of this classification is indicated thus—

1. **Stoulyam** and **Karsyata** (general or local fullness, or oedematous condition of the body or the reverse). (2) **Utchaaha** and **Aalasya Vrishataa** and **Kleebataa**, **Gnaana** and **Agnaana**, **Buddhi** and **Moha** (physical and mental fitness or the reverse), (3) **Kledana**, (lubricating qualities). (4) **Rasam** or **Bodham** (qualities to ascertain the taste). (5) **Daardhyaa** and **Sydhilya** (uniting or disuniting the different elements of the body giving it the firmness or relaxation), and 6. **Snehana** or **Tarpana** (cooling qualities).

Thus the 20 symptoms enumerated above can be classified accordingly in the following way.—The symptoms numbered 4, 5, 14, 15, 16, 18, 19 and 20 may be grouped under the first heading. Symptoms numbered 2, 3, 6 and 11 under the second. numbers 1, 9, 10, 12. 13 and 17 under the third: numbers 7 and 8 undar the fourth. The fifth and sixth headings are not represented here. This shows that all the manifestations of normal and abnormal **Kapha** can be very appropriately classified under the above six heads.

III

When the first two heads are taken together it makes five groups and these exactly fit in with the description of the qualities attributed to each of the five **Kaphas**, **viz.** I. **Avalambaka Kapha** [lit. which supports]—This regulates general or local fullness or œdematous conditions of the body or the reverse and the physical and mental fitness or the reverse. 2. **Kledaka Kapha** [lit. that which moistens]—This regulates the lubricating qualities in the body. 3. **Rasaka** or **Bodhaka Kapha**

[lit. that which causes perception]—This regulates the qualities to ascertain the taste, 4. **Shleshaka Kapha** [lit. that which joins]. This regulates uniting or disuniting the different elements of the body giving the firmness or relaxation. 5. **Tarpaka Kapha** [lit that which satisfles]—This regulates the cooling qualities in our body. ‡

‡ See Chapter XV—The five kinds of Kapha

The study of Kapha may now be summarised as follows:-

Derived from **Slisha-aalingana**, **Sleshma**, also called **Kapha** actually means that which joins and supports other materials. The bigger and coarse materials in our body, we find in the form of bones and muscles and the union between them can be seen with naked eye as they are coarse and big. We know that the bones, muscles and every part of our body are composed of millions of finer units called cells. Millions of bone cells form one bone as we see it, similarly millions of cells form the liver, muscles and every structure of our body. What binds them to keep them in position and thus enable them to perform a conjoint function? Each individual muscle cell contracts but the effect of contraction of only one cell will not be sufficient to be able to move a sand particle. When many millions of these cells contract simultaueously, the effect is aggregated. What joins all these fine as well as the big units of our body? It is **Sleshma** or **Kapha**. **Avalambaka Kapha**-the supporting **Kapha** as the term implies unites each individual cell of our body and acts as the vehicle for the nutrient element of our body the **Rasa Dhaatu**. **Kledaka Kapba** uniting with the hard food particles enters into their interstitine thus making them soft so that **Paachaka Pitta** can act on them readily and more efficiently. **Bodhaka Kapha** uniting with the food material makes it soluble so that the taste buds of the tongue can ascertain the taste of the material thus regulating the formation of **Paachaka Pitta. Sleshaka Kapha** unites and lubricates the coarser elements as bone to a bone, muscle to bone, etc, **Tarpaka Kapha** sooths the brain.

COMPARISON WITH A MOTAR CAR

In a motor car the vital defect always depends on bad driver, bad fuel, or bad lubrication, which represent in our simile **Vaayu, Pitta** and **Kaphaa**. As disorganisation of one or more of these three elements puts the whole machinery of the car in disorder, so in the human body, disease is produced when one or more of these three elements **Vaayu, Pitta** and **Kaphaa** are deranged. As these three are liable to be dis-organised they are appropriately termed **Doshas** (lit., those which are liable to be deranged). Thus **Vaayu, Pitta** and **Kaphaa** come to be known as **Tridosha**.

This, in brief, is the **Tridosha** theory of Aayurveda and this aspect of the physiology has been dealt with in this monograph.

SUMMARY

The basic principle of **Aayurveda** has been expressed in a nutshell—**Dosha Dhaatumalamoolam Hi Sareeram i. e.**, the essential constituents of our body consist of **Dosha, Dhaatu** and **Mala. Dhaatu (Dhaaranaath**—that suports) represents the combination of these units which hold or support our body. The fine and coarse substances are seven in number—**Rasa** (chyle), **Rakta** (blood), **Maamsa** (flesh), **Medah** (fat), **Asthi** (bone), **Majja** (marrow) and **Sukra** (semen). The four-runner of these **Dhaatus** is the **Rasa Dhaatu** from which all the other **Dhaatus** are derived. The **Rasa Dhaatu**, again, is nothing but the assimilated part of our foodstuffs after digestion and absorption. The remaining part of the food, **i.e.**, the excreta-urine, fæces and sweat, represents the **Mala. Dhaatus** and **Malas** are thus derived from the food we take. **Doshas**, on the other hand, are the forces which regulate and control the **Dhaatus** and **Malas. Vaayu** (derived from **Va** meaning movement) is the force which gives the movement or the dynamic force to the atoms of our body. Hence movement **Sanchaalana** is the chief function of **Vaayu** and that represents the nervous system of our body. **Pitta** is that force which as (1) **Paachaka Pitta** or **Paachaka** Fire breaks down the foreign particles, **i.e.**

* See also Chapters XIII, XIV, XV.

our foodstuffs, into simpler body elements and causes their assimilation in the form of **Rasa Dhaatu.** This is helped by the action of **Bhootaagni** which leads to the physical, chemical and physico-chemical changes of our food which is composed of five **Bhoota** elements (**Panchabhautika**). (2) As **Dhaatwagni** breaks down the **Rasa Dhaatu** inside the body still further producing heat (**Kaayaagni**) and energy, **Rasa Dhaatu** is again broken down into the next, the **Rakta Dhaatu** and so the seven **Dhaatus** one after the other. The **Paachaka pitta** and the other four **Pittas**, as already detailed, are the secretion of the glands of our body, of which the **Saadhaka Pitta** represents the secretion of the ductless glands. On account of these properties, the chief function of **Pitta** is heat production—**Swedana.**

Schleshma (lit. which joins or supports), or **Kapha** is that force which unites, supports and lubricates the finer and coarser particles of our body. Hence the chief function of **Kapha** is lubrication–**Snehana.** The **Kapha** represents the body water and the watery materials of our body. The three **Doshas** —**Vaayu, Pitta** and **Kapha** thus control and regulate all the functions of the body. These, in brief, are the basic principles of the **Tridosha** theory.

CHAPTER IV

THE

THRIDHAATU SIDDHAANTA:

REVIEW

By Bhishagratna Dr. A. Lakshmipathi, B. A. M. B. & C. M.
Madras.

[CONTENTS :—Dr. D. N. Banerjee's Summary of the article on Thri-Dosha Theory Reviewed—The Thri-Dhaatu Siddhanata, an Established Conclusion-Summary]

I shall now attempt to review the summary of the valuable article on the Thri-Dosha theory contributed by Dr. D. N. Banerjee M. B. (Cal.) M. D. (Berlin), Lecturer in Pathology, Charmichael Medical College, Calcutta, to the Journal of Indian Medical Association, Vol. 12. No. 4. Jan. 1943, and printed on page 41 above.

Dr. Banerjee has taken great trouble to collect and classify very valuable information from the texts. He has described many intricate subjects in a simple language. But, as he has missed the key, he made some fundamental mistakes in his very conception of the three Dhaatus. They are not forces themselves. The Thri-Dhaatus are material substances which have a dynamic force as a quality.

The summary consists of 21 sentences which are considered serially hereunder. The original sentence is denoted by S- (Summary) and the Review by R.

S. 1. The basic principle of Aayurveda has been expressed in a nutshell—Dosha Dhaatu Mala Moolam Hi Sareeram i. e. the essential constituents of our body consist of Dosha, Dhaatu and Mala.

R. 1. The dead body has no Thridoshaas. It is only the living body that consists of Doshas, Dhaatus and Malaas (Nutrients, Stationary tissues and Debris). They are the

physical constituents or the basic parts of the body. The ambiguity in the sentence should be removed. As it is, it may mean that the mental constituents of the body which are classified as Satwa, Rajas and Tamas are also included. Only the physical parts and only of the living body are meant here.

S. 2. Dhaatu (Dhaaranaath) — that supports, represents the combination of these units which hold or support our body.

R. 2. The word Dhaatu here means thirteen Dhaatus. The author seems to intend only seven Dhaatus, or tissues which he considers as holding or supporting the body. The group of seven Dhaatus no doubt gives shape to the body and they are comparitively more stable than the other two groups of the constituents of the body. The ambiguity should be cleared. Dhaatu may mean usually the group of seven Dhaatus also. But, the Malas are also considered as Dhaatus in their Prasaada state. Therefore, it must be clearly understood that the Deha Dhaatus here include all the thirteen, viz. the three Doshaas, the 7 Dhaatus and 3 malaas.

S. 3. The fine and coarse substances are seven in number—Rasa (Chyle), Rakta (Blood), Maamsa (Flesh), Meda (Fat), Asthi (Bone), Majja (Marrow), and Sukra (Sperm).

R. 3. Not only the seven stationary Dhaatus but all the thirteen have the two conditions, fine and coarse.

S. 4. The fore-runner of these Dhaatus is the Rasa Dhaatu from which all the other Dhaatus are derived.

R. 4. Among the 7 Dhaatus, Rasadhautu, no doubt, is the first. It consists of Thri-Dhaatus with Rasa cells. Thri Dhaatus are the products of Aahararasa (i. e.,) the assimilated part of the food stuffs, after digestion and before absorption into the tissues. The rejected part forms the malas. The words 'these Dhaatus' are ambiguous. If he means Sapta Dhaatus, their fore-runners are the Thri-Dhaatus (Tri-

Doshaas). The three Dhaatus are fore-runners of the Rasaadi Sapta-Dhaatus and the three malaas. The fore-runners of the Thri-Dhaatus again are the six Rasas of the food. The whole chain should be understood as follows :—The Thri Dhaatus go to form the Sapta-Dhaatus. The malas are also formed during this process. The description of the derivation must include all the three groups of Deha Dhaatus namely.

1. The Thri-Dhaatus, 2. The Sapta Dhaatus, 3. The Three Malaas, but not only the Sapta Dhaatus as is intended by the author.

S. 5. The Rasadhaatu, again, is nothing but the assimilated part of our food stuffs after digestion and absorption.

R. 5. The intermediary step has been omitted. The Thri-Dhaatus alone are fed by Aahararasa i. e., six Rasaas of the food directly and in the alimentary canal. The assimilated part of our food first makes up the Thri-Dhaatus which are then absorbed into the Rasa Dhaatu. Two descriptions are given as to the nourishment of the Sapta Dhaatus.

1. One is the simultaneous supply of the Nutrient material to all the Sapta Dhaatus. (Yugapath Vikshepa).

2. The other is that every Dhaatu goes to form the next Dhaatu in turn. This process is called Krama Parinaama. The first explains how the whole body is supplied with the nutrient materials viz., the three Dhaatus and the second explains how higher and higher formations of tissues are made by utilising the stream of the Thri-Dhaatus which may be taken as free Protoplasm or plasma. Harry Cambell, M D. B, S. F R. C. P., London, in his "Fundamental Principles of Treatment" talks of the right plasma as responsible for health and improper plasma for ill-health. This idea that the delicate changes which occur in the plasma are responsible for health and ill-health comes very near the Aayurvedic description of Thri-Dhaatus.

S 6. The remaining part of the food i. e., the Excreta—i. e. urine, faeces and sweat represents the Mala.

R. 6. The remaining part of the food and also excreta of the paripakva seven Dhaatus and of the Thri-Dhaatus go to form the mala. Only three malas are mentioned as typical.

S. 7. Dhaatus and Malas are thus derived from the food we take.

R. 7. Not directly from food. They are derived from Thri-Dhaatus, which alone are directly nourished by food. This is expressed in Aayurvedic language that the Shadrasas are converted into three Dhaatus through the three Vipaakas namely, Madhura, Amla, and Katu in the alimentary canal.

S. 8. Doshaas, on the other hand, are the forces which regulate and control the Dhaatus and Malas.

R. 8. No—Doshaas are not forces, (See page 18). They are the nutrients and are material (Dravya). Forces in Aayurveda are described as Gunas belonging to the Dravyas. Dravya (Substance), Guna (quality), and Karma (action) are the main heads or terms of description in which every thing is explained in Aayurveda. We accept that the Doshas regulate and control the Dhaatus and Malaas through their Gunas and Karma (qualities and actions respectively).

S. 9. Vaayu (derived from 'Va' meaning movement) is the force which gives the movement or the dynamic force to the atoms of our body.

R. 9. No--Vaayu is a predominently fluid (semi-gaseous) material.—Paancha Bhautika and living material whose guna (or quality) is a force which gives the movement or the dynamic force to the atoms of the body. Vaata works through the Vaata Yanthra Pranaali—the Nervous System.

S. 10. Hence movement (Sanchalana) is the chief function of Vaayu and that represents the nervous system of our body.

R. 10. First part—namely movement (Sanchalana) is the chief function (Karma) of Vaayu—is accepted.

Second part:-- that Vaayu represents the nervous system of the body—No. Nervous system is the Vaata Yantra Pranaali. It consists of the machinery (Tantra Yantra) of the body through which Vaayu acts and therefore Vaayu is called Tantra Yantra Dharah. Tantra means Human Body. Yantra means a machine. Tantra Yantra means a machine in the body. The chief function of Vaayu is to control the movement of all the machinery in the body.

S. 11. Pitta is that force which as (I) Paachaaka Pitta or Paachaka fire breaks down the foreign particles i. e., our foodstuffs, into simpler body elements and causes their assimilation in the form of Rasaadhaatu.

R. 11. No.—Pitta is not a force [See page 13]. It is one of the Deha Dhaatus consisting of Paanchabhautika materials predominating in Agni materials. This Agni material is found in all Deha Dhaatus and it gives them the assimilating power. It may be said to be responsible for all Bio Chemical changes. Thus the secretions of Kapha, Pitta and Vaata in the alimentary canal, in turn, cause the three Vipaakaas of food and thus assimilate the food into themselves. The whole process constitutes the so called digestion (Paachana) by the so called Jatharaagni. These are Saamaanya words (or general terms), which are qualified or limited by the Visesha or particular words.

The ordinary word Paachana includes in its meaning the three Vipakaas (Madhura, Amla and Lavana). It is the details of Paachana Karma with which Aayurveda is intimately concerned not with the Saamaanya word—Paachana. Similarly, Jatharaagni (digestive heat) and Kaayaagni (body heat) and such words are general terms which include the Agnis relating to Kapha, Pitta and Vaata also. Paachakaagni should not be taken as the only Agni in the alimentary canal. There are three Agnis namely Kaphaagni, Pittaagni and

Vaataagni relating to the three Dhaatus causing three Vipaakaas. When it is said that Paachaka fire breaks down the food stuffs, it omits all the details and is therefore misleading.

S 12. This is helped by the action of Bhootaagni which leads to the Physical, Chemical and Physico-Chemical changes of our food which is composed of five Bhoota elements. (Paancha-Bhautika).

R. 12. The food is Paancha - Bhautika and also the body including the Indriyas. This expression Bhootaagni is a Saamaanya or general term, not specially concerned with Aayurveda. It is a generel term, which belongs to all the Darsanaas or Sastraas. Aayurveda is concerned with the 13 Agnis particularly (as Visesha) relating to the Thirteen Deha Dhaatus. These bring about the Physical, Chemical, Physico-Chemical or Bio-Chemical changes in the body. Bhutaagnis are no doubt necessary particularly for the replenishment of Indriyas and their Gunas such as gandha (smell etc.) Vide-Charaka-Chikitsa. 15-12.

S. 13. Pitta is that force which (2) as Dhaatvagni breaks down the Rasadhaatu inside the body still further producing heat (Kaayaagni) and energy.

R. 13. The description is too general. Each of the seven Dhaatus takes up Thri-Dhaatus as nourishment through its own Agni and every one of these thirteen Deha Dhaatus contributes its own quota to the general heat of the body [Kaayaagni]. So, the term Dhaatvagni is too general.

S. 14. Rasadhaatu is again broken down into the next, the Raktadhaatu and so the seven Dhaatus one after the other.

R. 14. This is one of the processes called Krama Parinaama (see above R. 5. 2). It is accepted in general. But Tri-Dhaatus which are responsible for the formation of Rasa Dhaatu and also the other Six Dhaatus must be mentioned as the primary feeders of all the seven Dhaatus.

S. 15. The Paachaka Pitta and the other Pittaas as already detailed, are the secretion of the glands of our body, of which the Saadhaka Pitta represents the secretion of the duct-less glands.

R. 15. Not Pitta alone is a secretion. All the three Dhaatus with their five fold sub-divisions are secretions. All these secretions are supported by the alimentary secretions consisting of Kapha, Pitta and Vaayu. The other four divisions of each Kapha, Pitta and Vaayu are supported by the first respective secretions in the alimentary canal.

S. 16. On account of these properties, the chief function of Pitta is heat production (Swedana).

R. 16. As a general statement, it may be accepted. But the 13 Agnis of the Deha Dhaatus should be more carefully studied as they also contribute to the production of heat. It is the study of these details that forms the general physiology of Aayurveda.

S. 17. Sleshma (Lit,—which joins or supports) or Kapha is that force which unites, supports and lubricates the finer and coarser particles of our body.

R. 17. No.—It is not a force. (See page 15). It is a Dravya (material). It is one of the Dehadhaatus with its Gunas (qualities) and Karma (functions) as detailed under the division.

S. 18. Hence the chief function of Kapha is lubrication (Snehana).

R. 18. The chief function of Kapha is to sustain the strength of all parts of the body, and also of the body as a whole. Lubrication is one of the functions.

S. 19. The Kapha represents the body water and the watery materials of our body.

R. 19. Kapha is more a solid. It has a tendency to solidify. In fact Pitta is more liquid than Kapha. All the three Dhaatus have watery (fluid) conditions. Rasa, Rakta, Mootra and Sweda also represent body water. Kapha in the alimentary canal represents the secretions mainly from the mouth and stomach which carry on the function of converting food into sugar (Madhura bhaava). The other four Kaphaas have their own places, structure qualities and functions.

S. 20. The Thri-Doshaas — Vaayu, Pitta and Kapha—thus control and regulate all the functions of the body.

R. 20. Generally the statement is a correct one if it is intended to describe the three Dhaatus as materials (Dravyas) with their respective Gunas (Qualities), and Karma (Activities) as detailed in Aayurveda;

S. 21. These in brief, are the basic principles of the Thridosha Theory.

R. 21. These are not to be described as principles or theories but as facts relating to the Morphology, Anatomy, and Physiology of the constituents of the human body in the Aayurvedic language.

The term theory sometimes means, a speculation, a doctrine or scheme of things, which terminates in speculation or contemplation without a view to practice. (Webster's Dictionary).

Further, when the term theory is used it may mean a science as distinguished from the art, as in the "Theory and Practice of Medicine".

The words doctrine, tenet and hypothesis, which are used in the English language to convey the nearest idea, have their own limitations and therefore cannot be exactly applied to Thri Dhaatu Siddhaanta which stands for an established conclusion or a demonstrated Truth of Aayurveda.

The word-Thri-Dosha may be limited to the deranged condition only and the word Thri-Dhaatu to the normal state of the Dhaatus.

Therefore it is best to use only the word Thri-Dhaatu Siddhaanta, instead of Thri-Dosha Theory.

I heartily congratulate Dr. Banerjee on his successful efforts in unveiling some of the hidden Truths of Aayurveda and I earnestly hope that he will not take my review in any hostile spirit.

Thri-Dhaatu Siddhaanta
An Established Conclusion.

I realise that the same ideas are repeated very often in this address, but I found it necessary to do so in order to emphasize the view point of Aayurveda.

The structure, qualities and functions—Dravya, Guna, Karma of Thri-Dhaatu have been examined in their general, special and coherent states—Saamaanya, Visesha and Samavaaya conditions in the Daarsanic language and have been proved. The Thri-Dhaatu Siddhaanta is thus an established conclusion of Aayurveda.

SUMMARY.

I. Description :— Thri-Dhaatu Siddhaanta is a demonstrated Truth and an established conclusion

of Aayurveda. The Humoral Theory of the West though borrowed from this, was wrongly understood by them. Their forsaking of the humoral theory should not lead to condemnation of the Tri-Dhaatus.

The thirteen constituents of the human body are divided into Three classes. The nutrient three Dhaatus, the stationary seven tissues and the three excretory products. All other things are included in one or other of these thirteen constituents. This is a most rational and concise method of classification and it gives a comprehensive description of the human body as a whole.

II. Conclusions:— In the gross state, Vaata Pitta and Kapha are secretions in the alimentary canal. The structure qualities and actions of the three (gross and subtle) Dhaatus are described, Physically, Bi-Chemically, Physiologically, Psychologically, Pathologically and Clinically.

III. Review:— The article on Thri-Dosha Theory contributed by Dr. Dhirendra Nath Banerjee, M. B. (Cal), M. D. (Berlin), Lecturer, in Pathology, Carmichael Medical College, Calcutta, to the Journal of Indian Medical Association, January, 1943 has been reviewed.

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AAYURVEDA SIKSHAA

[A TEXT-BOOK OF AAYURVEDA]

IN

8 VOLUMES

VOLUME II

(SAAREERA STHAANAM)

SECTION I

DEHA DHAATU VIJNAANAM

BY

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CHAPTER I

Bhaashaa Viveka — Language Discrimination.

In **Aayurveda**, the **Deha Dhaatus** or the constituents of the body are thirteen Viz. the three **Doshas**, seven **Dhaatus** and three major **Malaas**. The three **Doshaas** are **Vaata**, **Pitta** and **Kapha**, the seven **Dhaatus** are **Rasa, Rakta, Maamsa, Meda, Asthi, Majjaa** and **Sukra**, the three chief **Malaas** are **Mala Mootra** and **Sweda**, **"Dosha Dhaatu Mala moolam hi Sareeram" (Susruta Sootra. 15 - 3).**

. The human body, as of course any other piece of matter has several different aspects, which may be viewed from different angles of vision. So, there can be different descriptions of the same subject ; and in describing any one particular aspect of the body, different observers may make different observations from their respective view points, **(Bhettaa hi Bhedyamanyathaa Bhinatti, Ch. Vi. 6-4)** For the same object, therefore, we may have so many different descriptions that, at first sight some of them, may seem contradictory

to each other even though each one of them may be true in its own perspective. This is specially marked in all branches of literature of the ancient **Hindus**, the characteristic genius of India being to hoard up all sorts of knowledge. No line of thought was considered as wholly useless. Amongst this diversity, the student will have to pick out those view-points which are most useful, relevant and rational for his own particular purpose, leaving aside the rest as of less importance.

Aayurveda, which originally formed a part of the **Vedas**—the oldest literature of the world—is no exception to this rule. So, when we remember that the **Veda Samhitaas** represent the knowledge of the ancient **Aryans** accumulated through centuries, and that that knowledge is not of one single subject but spread over diverse sciences, it is no wonder that the **Aayur-ved-Samhitaas**, as we find them to-day, will have incorporated in them so many different modes of expressing human thought, more especially, if we also remember that in its gradual evolution from the **Vedas**, **Aayurveda** had to pass successively through the dominant influence of the various systems of Hindu Philosophy. We, therefore, see in these **Samhitaas** different authoritative statements at different times. These are the results of positive experience,—of a multitude of **Aryan** sages covering a considerable period of time. And naturally there would be diversity in the modes of expression. The same subject has been explained in the popular (**Laukika**), Philosophical (**Daarsinika**), as well as in the technical or strictly **Aayurvedic Paaribhaashika** language. But, on proper study, all the different view-points may be classified and a rational understanding of the subject arrived at. This is the historical background of **Aayurveda** and it is well always to remember this when we commence the study of **Aayurveda** in any one of its branches.

Different Descriptions.

The human body has been described in **Aayurveda** both from its internal and external aspects. The present day Anatomists and Physiologists have also done the same. The two kinds of description may widely differ in certain

respects, according to the difference of their respective view-point. We must try to place ourselves in their position and then evaluate their statements. If we can do that, we shall see that their description is quite as correct and rational as the present day one. I shall even go a step further and say that in some of their fundamental concepts, the ancient **Aayurvedists** were even superior to the modern Scientists, who may, however, excel in giving more details about the constituents of the body and their workings.

As an example of different descriptions of the same object, we shall now take up the case of the human body considered as a whole.

i. Viewed from the point of its physical constituents the body has been described in **Aayurveda** as **Paanchabhautika** (**Ch. Sh. A.** 6-4; **Ch. Sh. A.** 4-6. **Su. Soo. A.** 17-24)

ii. Viewed as a living entity, the human body has been described as **Shaddhaatuja** i. e., consisting of six **Dhaatus,** namely the five **mahaa-bhootaas** and **Chetanaa** or **Aatma** (**Ch. Sh. A.** 1-16) as well as of 24 **Dhaatus** (following the view of **Saankhya.** (**Ch. Sh. A** 1-27; **Su. Sh. A.** Teeka.)

iii. Some take the body as consisting of **Srotasaas** only (**Ch. Vi. A.** 5-4)

iv. Viewed broadly, and from its most superficial aspect, the body has been described as consisting of six parts **Shadangam Sareeram,** the four extremities, the trunk and the head (**Su. Sh. A.** 5-3; **Ch. Sh. A.** 7-5).

v. This broad description may now be amplified and we then have enumeration of the **Pratyangaas** such as ears, eyes, nose, hands, thighs, fingers, nails etc. Coming next to the internal aspects, we go deeper and deeper and describe the muscles, the bones, the blood-vessels and then the internal organs.

vi. If the enumeration is continued and we go on from minute to still more minute parts, we finally come to the **Paramaaṇus** of the body which are infinite and cannot be perceived by the senses (**Ch. Sh. A.** 7 Teeka). But it is not the purpose of **Aayurveda** to view the body from

this extremely minute standard, because we shall be then tempted to go still further and ultimately come to the Absolute (the **Brahman**), which line of thought leads to **Moksha** and because if the body is not regarded as a unit but considered piecemeal, there would be a tendency on the part of the individual, as **Chakrapaani** says (**Ch. Sh. A.** 7-28) to lose interest in himself and thus to be indifferent to his own body.

vii. So **Aayurveda** stops at some finite **avayavas**, all of which, as we shall see, are taken together and classified as the **Doshaas**, **Dhaatus** and **Malaas**.

As we stated above, there are different descriptions of the human body, in both its internal and external aspects. But the most rational and concise, at the same time comprehensive, description of the body as a united whole viewed from the **Aayurvedic** stand-point has been very explicitly given first by **Susruta** and later repeated by the **Vaagbhata**, namely that the body is made up of **Dosha**, **Dhaatu** and **Mala**, (**Dosha dhaatu-mala moolam hi Sareeram. Su. Soo. A. 15-3. Dosha dhaatu mala moolo hi dehah. Asht. Sam. Soo. A. 16; Dosha-dhaatu malaa moolam sadaa dehasya. As. Hr. Soo. A. 11-1. Charaka**, used the same division implictly-vide. **Ch. Soo. A. 26-83.**

We may remark here that the term **Dehadhaatu** is not a newly coined one; it has been used by **Charaka** himself e. g. "**Dehadhaatu pratyaneekabhutaani dravyaani deha-dhaatubhir virodhamaapadyante**" (**Ch. Soo. A. 26-83**) and **Chakrapaani** in his commentary here says," **Dehadhaatunaam rasaadeenaam vaataadeenam cha**–Cf. (**Ch. Chi. A.** 25-5)

Although the body may be conceived as made up of an infinite number of **Paramaanus** or of **Bhoota** particles, **Aayurveda** has to deal always not with them directly but with the above three classes or groups of body-material, the all-pervading parts or **avayavas** of the body, the body **Trimoolams** as they may be called. It is their being component parts of the same body that constitutes their **Deha-dhaatutwa** or their **Samaanaa-dhikaranatwa.** All these body constituents are through-out **Aayurvedic** literature actually described through the **Naiyya-yika** method of six **Padarthaas** namely—**Dravya, Guna, Karma, Saamaanya, Visesha** and **Samavaya (Ch. Soo. A I,)**

CHAPTER II

Physical Properties of the Deha-dhaatus.

(Aakritigata–Saadharmyam)

1. **Dravyatvam.** All the **Deha Dhaatus** are **Dravyaas**, because each has specific **Gunaas** and **Karmas**. **"Yatraasritah Karmagunnaah Kaaranam Samavaayi yat tat dravyam"** (**Ch. Soo. a.** 1–5).

All **Dravyaas** are taken to be **Paanchabhautika** for the purposes of **Aayurveda (Sarvam dravyam paanchabhautikam asminnarthe. Ch. Soo. A.** 26-10). **"Tatra Prithivyaptejavaayvaakaasaabhyaam Samudayaad dravyaabhinirvriteih" (Su. Soo. A.** 41–3 also **Asth. San. Su. n.** 27.)

2. **Paanchabhautikatwam.** This follows from the above. The body is **Paanchabhautika** as we have already shown ; as the **Deha-Dhaatus** being parts which when joined together **(Samavaaya Sambandha)** make up the whole body, must of necessity be **Paanchabhautika** also. That the five **Mahaa. Bhootaas** are the constituting cause of the body is mentioned by **Dalhana "Upaadaanakaaranaani bhootaanyaakaasaadeeni" Su. Sha. a.** 2-13) or **"Sareeraarambhakaani Khaadeeni" (Chakra Ch. Su. a.** 2-48) The **Paanchabhautikatva** of the **Doshaas** has been described by **Vaagbhata I. "Vaavyaakaasabhyaam Vaayuh, Aagneyam Pittam Ambha prithveebhyaam Sleshmaa" (Asht. Sam. Soo. A 20)** according to **Cakrapaani. Pitta** is **"Aptejah Samaarabdham" (Ch, Su. A** 1–60 **Teeka).**

We may also note here that the three **Saankhya Gunaas, Sattva, Rajas** and **Tamah** are constituents of the five **Mahaabhootas** and the **Deha-Dhaatus** being **Paanchabhautika** these latter must have the common property of **Trigunatwa (Cf. Su. Sh. A** 2-22).

3. **Sankhyaavatvam.** The members of the three groups of **Deha-Dhaatus** may be enumerated. This is the property

of the groups. The **Doshaas** are three Viz. **Vaayu, Pitta** and **Kapha. Dhaatus** are seven-Viz **Rasaa** (Cycle and Lymph), **Rakta** (blood), **Maamsa** (muscles), **Meda** (fat), **Asthi** (bone), **Majja** (marrow) and **Shukra** (semen). **Malaas** are principally three–Viz. **Mala** (faeces), **Mootra** (urine) and **Sweda** (sweat); besides which there are **Malaas** of the **Dhaatus** also.

4. **Dehaavayavatvam**. Because according to **Aayurveda**, the **Deha Dhaatus** are the basic constituents of the body and therefore **Avayavas** or parts of the same. **Indu** in his commenttary says that the body is a combination of **Dosha, Dhaatu, Mala** and of nothing else. **"Doshaadeen Varjayitva nanyat Sareera-Sambandham sareere drisyante, Ta eva samyukta deha iti yaavat" (Asht. Sam. Soo. a. 28). Susruta** also in enumerating the different **pratyangaas** of the body includes **Dosha, Dhaatu** and **Mala** (**Su. Su**. a. 5–5). **Dalhana** calls them the **Avayavas** of the **Angah. Charaka** have also used the term when enumerating the different parts of the body including **Dosha-Dhaatu-Mala (Ch. Sh. a. 7)** e. g. **Chakrapaani** using the term **Sareeraavayava (Ch. Su.** a 12.7). Even the six **Rasaas**, which are **Gunaas**, have been called **Avayavaas** of the food by '**Chakrapaani**' **Madhuraamlaadeenaam Aahaaradravyaanaam (Ch. Su. a.** 5-4). It is in **Samavaaya** relation as **Anga** and **Angi** that the **Deha-Dhaatus** exist in the body. (**Cf. Indu, "Sareerascha dosha dhaatu mala Samudaayah"** (**Asht. Sam. a.**)

That different view-points existed all along is also proved by **Sivadaasa** saying that the body is composed of the seven **Dhaatus** alone. **"Saptadhaatukameva Sareeramuchyate" (Ch. Chi. a.** 15-24). We may, in a similar way, say that the body is nothing but a conglameration of **Tridhaatu** i. e., **"Tridhaatu mayameva Sareeram"** because it is the **Tridhaatu Kanaas** which go to form the different **Dhaatus** and **Malas** (Cf. **"Doshebhya eva dhaatoonaam pravritih," Indu, Asht, Sang. a 1.) Susruta** also says that it is by **Vaata-Pitta-Kapha** alone (**eva**) that the body is formed. **"Vaata Pita Sleshmaana eva deha Sambhava hetavah" (Su. Sc. a. 21-3)**. But among these different descriptions of the body, the most rational would be one by **Susruta** viz., **"Dosha dhaatu mala moolam hi Sareeram."**

5. **Dvividhaavasthaavatvam.** "**Sookshma sthoola bhedena.**" All the 13 **Deha Dhaatus** exist in the body both in a minute as well as in a gross state. This may apparently seem anomalous in the case of the very **Sthoola** matter, namely the **Dhaatus** and **Malaas**, but a little consideration will show that there are **Sookshma avasthaa** for these also in the body.

Sookshma Avasthaa

Let us take the hardest **Dhaatu**, the bone. Before proceeding further, we must go back to the body as a whole. The ultimate and minute **Avayavaas** of the body, as we have seen, are the five **Mahaa-bhoota paramaanus**, the body itself being the **Avayavi** the **Antyaavayavi** as it is called in the **Vaiseshika** language. But the five **Mahaa-bhootas** are the **Avayavaas** of every part of the body. So successive stages of **Avayavaas** to be formed out of the five **Bhootaas** are the **Tridhaatukanaas**. The next stage is the **Dhaatus** whose **Avayavaas** are the **Tridhaatus** themselves. Next we may consider the different **Pratyangaas** and organs of which the **Avayavaas** are the **Dhaatus**. Then we have the **Angaas** whose **Avayavaas** are the **Pratyangaas** and last we come to final **Avayava** the **Antyaavayavi** or the body whose **Avayavaas** are the six **Angaas** "**Shadangam Shareeram.**"

We thus get :—

AVAYAVI	AVAYAVA
1 Deha	1 Shadanga
2 Anga	2 Pratyanga
3 Pratyanga	3 Sthooladhaatu
4 Sthooladhaatu	4 Dhaatukana
5 Dhaatukana	5 Tridhaatu Kana
6 Tridhaatukana	6 Pancha Mahaabhoota

Beyond the five **Mahaa-Bhootaas**, **Aayurveda** does not usually go; as **Susruta** says, "**Bhootebhyo hi Param Yasmaannasti chintaa Chikitsite**" **(Sus. Sha. A 1.23) Teeka Cha. Sh. A. 7-17.** But even individual" **Bhootaas** are not the objects of considera-

tion for **Aayurveda**. What it does consider is **Bhautika** matter. The **Bhootaas**, of course, we do not see; neither do we see the **Dosha Kanaas** or the **Dhaatu Kanaas**, they being all very minute. It is only a group of these i. e., **Dosha Sanghaata** or **Dhaatu Sanghaata** or **Mala Sanghaata**, that can be percieved by our senses. This **Sanghaataavastha** is also expressed as **Avyaapee Stage.**

If we now consider the bone, we may say that it consists of bone **Kanaas** which being minute are invisible (always remembering, however, that a particular **Dhaatukana** itself is made up of **Tridhaatu kanaas** in some particular proportion). This is bone in the **Sookshma avasthaa**, the bone that is being nourished at every moment by the nutrient **Tridhaatu kana**, The bone, that is undergoing **Paaka** incessantly (**Ch.Su.A.** 28-3) giving out **Mala** and replenishing the next **Dhaatu** marrow. It is these **Sookshma Dhaatus** that are **Vahanasila (Cs. Cn. Vi. a. 5)** The bone that we actually see is predominently consists of bone **Kanaas** - the bone in the **Sthoola avasthaa.** It is when the **Dosha (Tridhaatu)** feed the seven **Dhaatus** (in the minute state) that they themselves are also in the **Sookshma avasthaa.** This is where **Doshadhaatu Sannipaat** takes place. (**Teeka Sa. A.** 6-18). It is also to be noted that when the **Dhaatus** begin to give out **Malaas**, the latter are in the **Sookshma avasthaa** and so it is here, at their places of origin that the **Malaas** are to be found in their most minute state. They are to be found in the most gross state at their respective places of exit from the body. That these are **Malaas** in very minute condition is stated by **Vaagbhata** II "**Malaanaam ati Sookshmaanam Duralakshyam lakshyayet Kshayam**" (**Asht. Sam. Su. A.** 11-23), When the term **Kritsna** or **Kevala** is issued to qualify **Shareer**, we may take it that the body with its innermost parts where the **Deha-Dhaatus** are to be formed in the most minute state is meant.

Sthoola Avasthaa

It remains now to be shown that the **Doshaas** also exist in the body in the **Sthoola** state. This they do when they are in

a compact or **Sanghaata** state, i. e., when large groups of **Dosha—kanaas** congregate together. This is well seen in the alimentary canal at the time of digestion of food i.e., at the time of **Rasa Dosha Sannipaata.** When food is put in the mouth, a profuse secretion of some viscous substance is poured into it. This is predominantly sweet and may therefore be called **Sleshmika.** It has in it certain proportions, though very small, of **Pitta** and **Vaata** also. But, because the **Kapha** part predominates very greatly, it may, for all practical purposes, be taken to be a **Kapha**-substance. This is **Kapha** in the **Sanghaata** state and is therefore **Sthoola.** We have next to deal with a secretion which is acid in character. This is the **Paittika** secretion at the second stage of digestion. In the intestines during the third **Avasthaa Paaka**, there is a **Vaatika** secretion. This, we may consider as **Vaata** in the **Sthoola** state. It is because, apart from its **Vaata** part, this **Vaatika** secretion has combined with it certain proportions of **Pitta** and **Kapha** also, that it can take up a liquid form. But because the **Vaata** part predominates very greatly, this liquid has a natural tendency to evaporate (**Chala svabhaavaat-vaatasya**) and so we may be allowed to call it semigaseous. And we may also take this **Vaatika** secretion, as a fair representative of **Vaata**-substance. The **Sleshmika** secretion, because of the preponderance of the **Kapha** part in it, has a natural tendency to solidify (**Sthiraswabhaawaat**) and so we may call it semi-solid. The **Paittika** secretion is always a stable liquid (**Drawatwaat saratwaacha Pittasya**) because of the preponderance of the **Pitta** part in it. Just as the ordinary (**Sthoola** or **Sanghaata**) earth, air, fire and water, though **Paancha-bhautika**, are taken to represent the respective (**Sookshma** or **Asanghaata**) **Bhootas** of **Prithvi**, **Vaayu**, **Agni** and **Ap**, so also the **Sleshmika**, **Paittika** and **Vaatika** secretions may respectively be called **Sthoola** or **Sanghaata Kapha-Pitta-Vaata.** They can be seen and handled. And I maintain that they are fair representatives of the **Sookshma** or **Asanghaata Kapha-Pitta-Vaata** which we can not expect to see or handle, but whose existence and properties can be inferred by examining the **Sthoola Kapha-Pitta-Vaata.** As **Gangaadhara** says, "**Sthoola-**

bhootaih Sookshmabhootaanam Kaaryair anumaanam bhavati and he quotes the **Saankhya "Achaakshushaanaam Anumaanena-bodhah Sthoolat Pancha tanmaatrasya" (Ch. Sha. A. 2–9 Teeka).**

6. **Avakaasha Poorakatvam** i. e., occupying some space. This, of course, follows from the **Deha-Dhaatus** being **Paanchabhautika** matter. This property is evident in the case of **Dhaatus** and **Malaas** which are ordinarily visible to the naked eye. But that the **Doshas** must normally occupy some space in the body may be inferred from the statement of **Charaka** that a certain portion of the **Kukshi** should be left empty for the occupation of **Vaata-Pitta-Sleshmaa (Ch. Vi. A. 2). Charaka** has given a rough estimate of the quantities by **Anjali** i. e., by volume of those of the **Deha-Dhaatus** (including **Pitta** and **Sleshmaa**) which are in the liquid or semi-solid form **(Ch. Sh. A. 7–20). Vaayu** has no definite volume in the body, because ordinarily it is in the gaseous state. But there is no doubt that like all forms of matter, it also occupies space. This is proved by the statement that all vacant places within the body are filled up by **Vaayu** when aggravated ; **" Dehesrotaamsi riktaani Purayitwaa Anilo Bali" (Ch. Chi. A. 28–18).**

7. **Bhaara parimaanavatvam gurutwamwa**, i. e., having weight. All **Paanchabhautika Dravyaas** must have some weight. The terms **Laghu** and **Guru** are applied to denote degrees of density of a body. Every **Deha-Dhaatu**, including also **Vaayu**, is made up of **Avayavaas** or parts. (**Kaasyapa** has referred to **Vaata-particles** as dominating cell-division and tissue-formation, **"Vaayuparamaanvah Samyoga vibhaaga chesta-dhikatraah" (Ko. Ps. Sam. page 52).** The density of a particular **Dhaatu** depends, of course, upon the degree of compactness of these **Avayavaas.** In the **Vaayu-Dhaatu**, compactness is minimum and so it has least weight-volume per volume, i. e., least **Gurutwa.** Therefore, it is called **Laghu.** This has been very aptly described by **Chakrapaani** when he applies the term **Nividaavayavatva** to density,—**"Asanghatam, Pitta-sleshmavad Avayava sanghaata rahitam : Anavasthitam, chalaswabhaavam; Anaasaaya, chalatwena Anivdaavayavatvena chetimantavyam"**

(**Charaka Ch. Su. A. 22–6**). **Vaayu** being of the nature of a gas, its molecules or **Avayavaas** are less closely packed and can therefore fly about without much hindering each other. So it is this property of **Anividaavayavatva** that makes **Vaayu chala**. It must always be remembered, therefore, that the terms **Guru** and **Laghu** as also the other pairs of the 20 **Gunaas** are only comparative. There cannot be any substance which is absolutely **Laghu** or absolutely **Rooksha**. **Kaphaa** being semi-solid is **guru**, **Pitta** being liquid is **Sara** and **Vaayu** being gaseous is **Chala**. Susruta has ascribed the property of **Laghuta** to gaseous (**Vayaviya**) and **Guruta** to both liquid (**Aapya**) and solid (**Paarthiva**) matter, (**Su. Sh. A. 1–16**).

8. **Moortatvam** : i. e., having shape. All the 13 **Deha-Dhaatus** being **paanchabhautika** have a proportion of **Prithvi** in them and **prithvi** gives **Moorti** to a body (**Cf. Tashya purushasya prithvimoortih Ch. Sha. A. 5/5; also Prithwyaatmakam Moortih Ch. Sa. A. 4–22; "Parthiwastu sarvamoorta samuho gurutaacha" Su. Sha. A. 1-26**). Those parts of the body which are **parthiva** i. e., with a greater proportion of **prithvi** in them, have the most defined shape e. g., the solid parts like the bones, nails, muscles, fæces, hair etc. (**Cf. Ch. Sha. A. 7–26**) The liquid parts of the body such as lymph (**Rasa**), blood, **Kapha**, **Pitta**, urine, sweat etc., have less defined shape. **Vaayu** being of the nature of a gas, has the least defined shape.

9. **Indriya Graahyatvam**: It is evident from the above that all the **Deha-Dhaatus**, including **Doshaas**, can be perceived by the senses when they are in the **Sthoola** state. The **Sookshma Deha Dhaatus** being very minute are out of reach of our senses (**Cf. Ch. Sha. A. 7–17**) but their existence can always be inferred from their actions in the body (**Anumaan-sidha Cf. Chakrapaani—"Swaroopamhi Vaataadinaam Kaarya-gamyameva" Su. Soo. A. 28–6 (I)**).

CHAPTER III

Common Physiological Properties of Deha-dhaatus.

(Prakritigata - Saadharmyam)

1. **Dhaatutwam, Deha dhaarakatwamvaa.** The three groups of body-matter are all **Dhaatus**, because each one of them, when in the normal condition, sustains the body. This follows from the fact that all are **Avayavaas** of the body. There has been some objection to the term **Dhaatu** being applied to the **Doshaas**. But the **Doshaas** in the physiological condition can, very appropriately, be called **Dhaatus** because,—

[1] In the first place, it is these three **Doshaas** and these alone which are the original constituting cause of the body, as we have already shown (**Cf. Su. Soo. A. 21–3**). [We are, ofcourse, speaking here in **Aayurvedic** language, giving up the **Daarsanic Paanchabhautika** language according to which the five **Bhootaas** may also be called **Dhaatus** (**Cf. Su. Sha. A. 2–35**), and the original constituents of the body are these **Bhootaas** only].

[2] Secondly, it is these three **Doshaas** (**Tridhaatu**) which enter into the composition of the **Sapta-Dhaatus**. We shall deal with this fact more fully later on.

That the **Doshaas** sustain or preserve the body is asserted again and again by everybody; e. g., **Pidyate dhaaryate chaiva Vikritavikritais tatha (Ch. Chi. A. 26-262)**

Shareeram idam dhaaryate (Su. Sha. 21-3)

Dehae taistu dhaaryate (**Su. Stra. 22–4**) also (**Su. Soo. 22–8**)

Tryo doshaa Dhaatavaascha Pureesham mutrameva cha deham Samdharayantyete (Su. wa A. 66–6)

Doshaa Sthirikarnaat Sthunaah Dhranaat Dhaatawah (Asht. Sam. Su. A. 20).

Chakrapaani in explaining the word "**Dhaatu Pradooshanam**" in connection with **Dravyaas (Ch Su. A. 1–67)** says—"**Vaataa. deenaam samatwena sareera dhaaranaatmakaanaam tathaa rasaadeenaamcha dooshanam**" so he has taken the three **Doshas** in the normal condition as **Dhaatus** in addition to the seven **Dhaatus**. There is an instance where **Charaka** has used the term **Dhaatu** for even a vitiated **Dosha**. "**Asticha shita, saadhyopi Dhaatu-Jwarakarah**" (**Cha. Vi. A. 3-44**) on which **Chakrapaani** comments "**Dhaatuh Pittamushnaroopam**". **Chakrapaani** has also clearly hinted that it is in the vitiated condition that the term **Dosha** should be applied to **Vaata Pitta-Kapha**, when in explaining "**Ata urdhvam kaphe mande**" (**Cha Chi. A. 3-264**) **he says**, "**Yadi kapho nasthyeva Dosha rupah Tadaa.**" So **Vaata-Pitta-Kapha** are to be considered in two conditions,—

(1) the Physiological,—**Dhaatu roopa**

and (2) the Pathological—**Dosha roopa.**

The use of such terms as **Dushta Dosha** as in "**Dushta Dosha gatir yaawat**" (**Cha. Sh. 6-28**) is, strictly speaking, a misnomer. It is better, therefore, to introduce some term for the **Doshas** in the Normal (**Avikrita, Adushta or Saamya** state, and I propose the term **Tridhaatu** for this purpose. Individual **Doshas** when in the physiological condition may be described as **Vaayu-dhaatu, Pitta-dhaatu** and **Kapha-dhaatu.** The term **Tridhaatu** is not a new one, but has been first used in the **Vedas**, "**Tridhaatu Sharma vahatam Subhaasyati**" (**Rig. 2 m, Ashta 3 Adhyaaya 4 Varga 6 Richa**). Why the term has not been used in **Aayurveda**, I do not know. It may be that because the Physicians have to deal more with the deranged body, the **Dosha** term, although pathological, has been universally accepted to denote **Vaata-pitta.kapha** even in the physiological condition. But because here we are laying stress upon the latter condition, we are entitled to use the term Tridhaatu to denote the normal **Vaata-pitta.kapha.**

In fact, as we have shown, the **Tridhaatus** are the **moola** or **Kaaran Dhaatus** of the body, the **Sapta.dhaatus** and **Malas**

are the **Kaarya Dhaatus**. Regarding the **Malas**, **Susruta** has described their sustaining functions,– **"Pureeshamupasthambham Vaayvagni dhaaranamcha"** etc. (Su. Su. A. 28-6)" **upastatambho awastambhah, Shareeradhaaranam" Dallahna** (Cf. As. Sangra. Su. H: 16) **"Awashthambhah Shariradhaarana shakti". Indu**; also **Charaka "Sarvadhaatu Kshayaartasya balam tasyahi vidbalam"** (Cha. Ch. A. 8-42). So we see that all the three groups are normally **Dhaatus**, of which

(1) the **Doshaas** are **Mooladhaatus** i. e., original constituting **Dhaatus**,—the incoming **Poshaka Dhaatus**;

(2) **Dhaatus** are **Baladhaatu** or **Saaradhaatu** from the root **Dhri** to bear (weight)—the **"Dhaaraka Dhaatus"** of the body; what **Charaka** has described as **"Dehadhaataaro dhaatawah"** and **Chakrapaani** explains as **"Visheshena Deha dhaarakaah"** (Ch. Chi. A. 25-25).

(3) **Malaas** are **Maladhaatus** or **kitta-dhaatu**, from the root **Kit** to go out,–the outgoing **Dhaatus**.

Charaka has given the relation between these three groups of **Deha dhaatus** in their physiological or **Dhaatu-state**. They support one another: **"Prasaadkitte dhatoonaam Paakaadevam widdharchhatah, parasparopasamstambhad Dhatto Dehe parasparam"** (Cha.Chi. A. 25-16).

Gangaadhara here is very definite about both the **"Prasaada and Kitta"** being **Dhaatus**, **"Tau Prasaada-Kittau dhaatoo, yatah parasparopasamstambhaat dehe parasparam dhatta iti."**

The term **Dhaatu** may, therefore, with cetrain limitations be applied to **Doshaas, Dhaatus** and **Malaas** alike. When it is used singly it will invariably denote any one of the seven **Dhaatus.** To apply it to **Doshaas** and **Malaas**, the term must be qualified e. g. **Tridhaatus** will indicate the three **Doshas** collectively when they are in the physiological nutrient state and **Vaata-Dhaatu** etc., to denote them individually. The **Malaas** as body-sustainers may, in a similar way, be denoted by the term **Kitta-dhaatu.** I would prefer the term **Kitta**

to **Mala.** Thus any confusion or ambiguity will be avoided and at the same time the terminology would be more scientific and rational. In fact, when defining diseases **Charaka** has used the term **Dhaatu "Vikaaro dhaatu Vaishamyam"** (**Cha. Soo. A. 9-4**) and **Chakrapaani** explains "**Dhaatawo Vaatadayah rasaadyacha Tathaa rajah Prabhritayascha.**"

2. **Soshmatva**: The **Deha-Dhaatus** being all **Paancha-bhautika** must have a proportion of **Agni Bhoota** in each of them. But there is a fundamental difference between a animate and an inanimate body. Both are **Paanchabhautika;** but whereas the **Bhoota** particles in the later are inert i. e., with their activities unmanifested, those in the former have manifested activity, in the sense that the body being living has the power of digestion, assimilation and excretion, and individual parts consisting of **Bhautika** particles must also have these powers. This power of digestion and assimilation is ascribed mainly to the **Agni**-part of the **Bhautika** molecules and it is these activities of **Agni** that becomes signs of life. As **Aayurveda** has to deal with the living body, it has very rationally given the characteristic names of **Dosha-Dhaatu-Mala** to the basic constituents of the body, to distinguish them from the ordinary **Bhautika** molecules which are the basic constituents of all matter, whether living or non-living. Whenever we speak of **Dosha-Dhaatu-Mala,** we atonce know that these refer to living objects.

It is evident from the above that those parts of the body which have more of **Agni-bhoota** in them e. g., **Pitta** and **Rakta** will have very marked **Agni**-activities. Of the three, the **Doshaa**-group has the most power of digestion and least of excretion. The **Dhaatus** have the maximum power of assimilation amongst the three groups. The **Malaas** themselves being excretions have the least power of digestion and assimilation.

That all the **Deha-Dhaatus** have **Ushmaa** is stated by **Vaagbhata II** in a striking passage,—"**Doshadhaatu malaadeenaam ushmetyaatreyashaasanam**" (**Astagahrudaya. Sha. 3-46**).

The senior **Vaagbhata**, thouh not specifically mentioning the name of **Aatreya**, has also said the same thing. "**Anye punaraachakshate Dosha-Dhaatu-Mala Sannipaata Janito antaroshmaa yathaa nirdishtaadhisthaana karmagniriti**" (Asht Sam Sh. A. 6). **Indu** here says;– "**Anye Punaraachaaryaah pittam agniriti, nechhanti doshaadi samyoga Vishesha Janito antah Shareeraushmaa grahanyadhisthanah paakaraagaadi Karmagnirityaahuh.**" **Chakrapaani** has also mentioned **Doshoshmaa** when in explaining the passage "**Swena tenoshmanaa chaiva kritva dehoshmanaa balam**" (**Cha Chi. A. 3-1-30**), he says, "**Swena iti Jatharaagnyooshmana; Dehosmana iti Sakaladeha Chaarinah praakritoshmanaah, Vaatasleshmanastu yadyapi pittavad ushmaa naasti Tathapi Tayobhootatwena ushma yosti sa iha graahyah**". That there are other **Agnis** besides the **Bhootaagnis**, **Dhaatvagnis** and **Paachakaagnis** has been mentioned by **Chakrapaani**."**Yaanyagnyantaraani up-dhaatu malaadigataani**" (**Cha. Chi. A. 15-38**).

It seems, therefore, that the confusion about **Agni** has occured in **Aayurvedic** literature by postulating so many **Agnis**, not only of different varieties but also giving different names to the same variety, e. g., **Kaayaagni**, **Dehaagni**, **Antaraagni**, **Jatharaagni**, **Bhootaagni**, **Dhaatvagni** etc. But if we remember that the activities of the **Deha-Dhaatus** in all their aspects of **Paaka**, **raaga**, **Daaha** etc., cover fully all the different **Agni**-activities variously named and described in **Aayurveda**: the matter would be much simplified and the confusion removed. To denote all the **Agnis** of the body as a whole, we may use the term **Dehaagnayah** always in the plural.

3. **Upachayaapachayatvam**; that is to say, all the **Deha-Dhaatus** are constantly undergoing alternate anabolisms and katabalism. These constructive and destructive metabolisms or changes in the **Deha-Dhaatus** are physiological and not pathological like the **Kshaya** and **Vridhi** of the **Dhaatus**. From the very root meaning of **Sareera** (**Sri.** to tear to pieces, "**Shiryatee iti sareeram**" (**Charaka. Soo. A. 1-6**) and of **Deha** (from the root **dih** to burn), it follows that the body i. e., in the normal course, constantly being wasted away. This waste is simultaneously is made up by food and air. (So, the body

is called Kaaya, from the root Chi to gather up). It is these alternate Apachaya and Upachaya of the body,—this vital life-process, that is the criterion by which we judge whether a body is living or non-living. There is no break in this process for a single moment, because even when a man is apparantly completely at rest, he must breathe i. e., take in air. So, atleast one organ or Yantra of the body must always be kept active. This cycle of vital activities of the body is beautifully expressed by Charaka. He says that like the onward march of the Eternal Time, the Paaka or combustion of all the Deha-Dhaatus is going on incessantly in the body "Kaalavat anavasthita dhaatu Paakam" (Cha. Soo. A. 28-3) and it is as a result of a series of digestive processes that the waste created thereby is made up and the whole body continues to be maintained properly with its strength and energy unimpaired "(Kevalam Sareeram upachaya-bala-varna Sukhayushaa yojayati)" and all the bodily Dhaatus invigorated "(Sareera-dhaatoon urjayaticha-ibid.)" It is thus that the cycle of Apachaya and Upachaya goes on without break like the revolutions of a wheel, "Santatyaa Bhojyadhaatunaam Parivritistu chakravata" (Cha. Chi. A. 15-22). In explaining this, Gangaadhara says; "Bhojyanaam dhaatunaam Santatyaa Chakravat Pravritih". The food is first eaten up by the famished Apachita Tridhaatu and thus fattened these Upachita Tridhaatu in their turn supply the requisite nourishments to the Apachita seven Dhaatus and Malaas.

4. Parinata-aparinataavasthavatvam: It is evident from what we have already said that all the Deha-Dhaatus are being freshly formed in the body to make up for the constant wear and tear of themselves. So for every Deha-Dhaatu there is an initial formation stage, its Aparinataavasthaa. In between the two stages, there is an interval when that particular Deha-Dhaatu is being formed.

CHAPTER IV

Common Pathological Properties of Deha-Dhaatus

(Vikritigata – Saadharmyam)

1. **Doshatwam.** Although primarily it is only the three **Doshas** which can directly vitiate the body, the **Dhatus** and **Malas** also when associated with a deranged **Dosha** can vitiate others. The **Doshas** are the direct or proximate (**Pratyaa-sannam**) vitiators, the other **Deha-Dhaatus** are indirect ones (**Cf**) Chakrapaani—(Ch. Soo. A. 2/57—" Doshasamjnaatu pidaakartritva Saamaanyaad Adoshepi syaad").

2. **Malatvam**: When any **Deha-Dhaatu** becomes an affliction Aabaadhakara,— it may be said to have been turned into a **Mala** i.e. Malabhoota, "Tatra Malbhootaaste ye Shareera-syaabaadhakaraah" (Ch.Soo. A. 6/27.

3. **Saamatvam:** Due to deficiency of **Agni**-activities or due to over-loading of the stomach, any one of the **Deha-Dhaatus** may not be formed in a fully mature state e. g., "Aparipaquaa yeva Vaata-Pitta Sleshmaanah" (Su. Ni. A. 6–4). " Pradustaamabaddhamaargaah " (Ch. Ve. H. 2–22.) " Ityatra Apaqua Aahaaro annaraso vaa Apaqua Aama uchyate "chakra, "Sarvadeha pravitritaan Saamaan doshaan na nirharet" (As. Saa. Soo. A. 21. Cf. Cha. Chi. A. 25/45–46).

It is better here to elucidate the point regarding the Aparipaqua or Aama-Doshas.

To begin with we have first the **Aparipaqua** or **Aama** i. e., raw food which is unfit for human consumption. So, it has to be cooked. When well cooked it becomes **Paripaqua**

and fit for consumption by the body i. e., by the secreted **Tridhaatu** in the alimentary canal. This cooking of the food takes place outside the body away from the consumer. Within the body, however, the **Paaka** or **Pachankriyaa** of food means the **Bhojanakriyaa** of the **Tridhaatu**. The secreted **Kapha-Pitta-Vaata** one by one attack the food and eat it up. At the end of this eating-up process and what it ordinarily called the digestion of the food, the food has become **Samyak Vipakva** and the **Kapha–Pitta–Vaatas** have had their full quota of feeding. The food has disappeared eaten up by the **Tridhaatu** and in its place, we have now the very well-fed (**Paritripta**) **Kapha-Pitta-Vaata**,—the **Paripaqua** or **Paripushta Tridhaatu**. Whatever portion of the food they have not eaten up is left as **Mala**, the **Pureesha** and **Mootra**. Thus we get **Samyakvipaquaanna** = **Paripaqua Vaata Pitta-Sleshmaa** + **Mootra Pureesha**. So **Asamyakvipaquaanna** means **Aparipaqua.Vaata-Pitta-Sleshmaa** i. e, ill-formed **Tridosha**.

The effect of the digestive process as we shall see is to break up the **Paanchabhautika** pattern of food and create **Tridhaatu** pattern out of it. So well-fed i. e., **paripushta** or **paripaqua** means well–formed **Tridhaatu**. If there be **Mandaagni** i. e. deficiency in the **Agni**-activities of the secreted **Kapha–Pitta–Vaata** or if there is over-loading when the **Tridhaatu** cannot fully cope with the excessive quantity of indigested food, it is obvious that there will be partially formed **Tridhaatu-Kapha-Pitta-Vaata** side by side with fully-formed ones. The partially formed **Tridhaatus** have been called **Aama** or ill-digested **Anna** and we get the expression **Aama-samprikta Dosha**, meaning that fully-formed **Doshaas** are mixed up with partially-formed or ill-formed **Doshaas**. This is **Saama-dosha**. Similarly, **Aama-pureesha** and **Mootra**. And as the **Saama Tridhaatu** become food for the **Saptadhaatus** the later also may become **Saama**.

4. **Kshayavriddhivatvam**: Every **Deha-Dhaatu** may become pathologically deficient (not the physiological **apachaya**) i. e., less than its proper quantity in the body. This is the

Kshaya of the **Dhaatu.** Similarly, the quantity may be in excess to the normal. This is **Vriddhi** (not the physiological **Upachaya** – e. g.—**Ch, Saa. H. 6/4**).

5. **Deha-naasakatvam:** The **Deha-Dhaatus** when deranged may cause destruction of the body. It is obvious that anything which, in the normal condition, sustains and preserves the body may, when vitiated, cause destruction of the same. ("**Cf. Yadaahyasmin Sareere-dhaatawo Vaishamyamaapadyante tadaa klesham Vinaasam va praapnoti" Ch. Sa. A. 6–4**).

This finishes the common properties of the **Deha-Dhaatus.** We now come to the special properties of the different groups, taking up the **Dosha** group first.

CHAPTER V

Special Characteristics of the Doshas

(Dosha – Vaisishthyam)

1. **Ahaar-Poshyatvam**: i.e, the characteristic of the three **Doshaas** (the **Tridhaatu**) is that it is only these which are directly nourished by food.

It is known that by nature the human body is constantly being wasted away every moment without break. So the question of replacement of this waste i. e., proper nourishment of the body is the most vital one for medical science. The ordinary man is given a very simple answer to this question. He is told that **Anna** nourishes the body. This is the **laukika** or popular view of the nourishment of the body. So **Susruta** says—"**Praaninaam Punarmoolamaahaarah" (Su.Soo.A. I–28) Cf. Ch. Soo 27–35.** When the **Daarsanika** with a more scien-

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tific frame of mind begins to probe into the matter, he looks into the basic structure of all the bodies and declares that the body is **Paanchabhautika** and the **Bhautika** parts of food nourish the corresponding parts of the body. **(Cf. Su. Soo. A. 46-524)** and **"Yathaa swam swam cha pushyanti deha dravyagunaah Prithak paarthivaah paarthivaan eva seshaah seshaan-cha Kritsnsah" (Ch. Chi. A. 25–24).** Also, **"Tatascha evam viklinna aahaare pancha panchaatmakaa Mala-bhootaa-gnayo Vaayuna-vyastaan yaathaaswam pancha eva bhoota-gunaanaahaarasthaan pachantite paquaah punaryathaaswameva dehaasritaamscha Swavikara-bhootaan bhoota-gunaan aapyaa-yanti" (As. Saan. Sa. A. 61).**

But as a **Chikitsaka** or medical man, when the **Aayurve-dist** had to give his version of this same vital life-process he took up its practical side and so adopted an altogether different mode of expression. He said that it is the six **Rasas** of **Dravyas** that keep the body in equipose, **"Te (Shadrasa) "Samyag upayujya-maanaah sareeram yaapayanti" (Ch. wi. A. 2–4) "Yaapayantiti saammyena avasthaapayanti" (Charaka. Cf., Sareeram dhaaryantiha Shadrasaah samyagaadritaah" (Bhel. Vi. A. 2).** So, what the layman takes to be **Anna**, the **Daarsa-nika** consideres as five **Mahaa-bhootas** and the **Aayurvedist** takes to be the six **Rasas. Bhela** has gone so far to assert **"Ayam purusho rasa-janmaa rasajeevee rasa-jwalanee-rasa samaadhiko Rasajeevanascha bhavati" (Bhel. Sha. A. 4 Cf. Su. Soo. 124–22)".**

The **Shadrasa** :— It is his science that has taught the **Aayurvedist** to look upon the six **Rasaas** as of the most practical value. Much importance has, therefore, been atta-ched to this particular **Gunas** of **Dravyas,** so much so that to the **Shadrasas** have been attributed all the **Gunas** — the physical properties such as **Guru, Laghu, Snigdha** and the **Karma** of the **Dravyas** including **Indriyaposhana** that the **Aayurvedist** has even considered **Rasa** as a **Dravya** in a secon-dary or **Aupachaarika**-sense that he has done this, is for his own conveniences to suit the special purpose of **Aayurveda** ; as

Charaka says :— " **Gunaa Gunaasrayaa noktaastasmaad-rasa-gunaanbhishag, Vidyaad dravyagunaan Karturabhipraayaah prithagvidhaah**" (**Ch. Su. A. 26-36**).

In fact, the term **Guna** in the above passage from **Charaka Samhita** means the respective **Avayavas** as **Indu** says, " **Sarvatra Gunasabdo avayavavaachi** " and as we have said before, **Chakrapaani** also considers the six **Rasas** as **Avayavas** of **Dravyas** (**Cha. Soo. A. 5-4**). With reference to the passage of **Charaka** just quoted, **Chakrapaani** says :— " **Iha cha dravya-gunaanaam raseshu yad upacharanam tasyaayamabhipraayo yat madhuraadi nirdesenaiva snigdha sitaadi gunaan api praayo madhuraadya-vyabhichaarino dravye nirdishtaa bhavanti iti na madhoratvam nirdishya. Snigdhatvaadi-pratipaadanam punah prithak kriyata iti** ", may again be considered as so many **Avayavas** of the **Shadrasas**, so all the **Gunas**.

But the most scientific language for **Aayurveda** is the language of the **Tridosha**. So, we must speak of the six **Rasas** in terms of the three **Doshas**. That is why **Aayurveda** has first of all established the relation between the **Shadrasas** and **Tridosha** and then the re-action between them within the body. We have been told that a group of three **Rasas** augments a particular **Dosha** and another group mitigates the same. (**Cha, Vi. A. 2-6**) We thus get the following relation.

Madhur-Aamla-Lavana	augment	**Kapha**
Katu-Aamla-Lavana	,,	**Pitta**
Katu-Tikta-Kashaaya	,,	**Vaata**

We may also take these same groups as belonging to the respective **Doshas** : **Cf. Kapila-Baala** as quoted by **Vaagbhata I, As. Sam. Soo. A. 20.** " **Katva-mla lavanam pittam, Swaadva-mla lavanah Kaphah, Kashaaya-tikta-katuko Vaayur-dristah anumaantah**". But the dictum of **Aayurveda** is always to describe things by preponderance — "**Utkarshena hi Vyapadeshah**" (**As. Su. Soo. A. 29**) — So it is said that of the three groups of **Rasas**, **Madhura** is the predominent **Rasa** of **Kapha** and as it

augments **Kapha** most, **Amla** is the predominent **Rasa** of **Pitta** and it augments **Pitta** most. As regards **Vaata**, the **Katu Rasa** is considered to be the one which augments it most.

[Strictly speaking considering the **Bhautika** constituents of the **Rasas** and **Doshas**, the **Tikta Rasa** should be the one to augment **Vaata** most because its properties are practically identical with those of **Vaayu**, its **Bhautika** constituents predominating in **Vaayu** and **Aakaasa**, the very same as those of the **Vaayu Dhaatu** of the body].

Shadrasa-paaka :— Now, the **Rasas** can augment the **doshaas** only when they come in contact with the later within the body, that is when **Rasa-dosha-sannipaata** takes place. It is then that a **Rasa** which has properties similar to those of a particular **Dosha** will increase that **Dosha** (**Ch. Vi. A. 17**). It is, however, known that the six **Rasas** as such cannot nourish the body. They have to undergo drastic changes within the body so as to become suitable for consumption by the body. So the questions that immediately arise here are: How are these changes brought about, by whom and where and when? Where and how do the **Rasas** come into contact with the **Doshaas**?

CHAPTER VI

Three Alimentations

(Trayovasthaa - Paakaah)

Avasthaapaaka:—As regards the place where these changes take place, **Charaka** has first made a general statement that is in the region between the umbilicus and nipples (**Cha. wi. A. 2–27. Cf. Su. Soo. A. 22–12**). Giving details later on, he describes the order or sequence of the three successive changes in three characteristic stanzas (**Cha. Chi. A. 25/6–22**). According to **Charaka**, the first change is that into **Madhura**. It begins as soon as food (**Shadrasa**) is taken **Annaasya bhukta-maatrasya** i. e., in the mouth and continues in the first part of the stomach, the **fundus**, until the first change (**Shadrasasya-prapaaka**) is complete, which is known when the whole of the indigested food is turned into a sweet pulpy mass and a frothy **Kapha** is produced. Then begins the next change into **Amla** (**Annasya pacchyamaanasya vidagdhasya**) in the pylorical part of the stomach and continues in the duodenum up to the time of **ashyaacchyavamaan** until the whole mass gets an **Aamla-bhaava** as a consequence of which a clear **Pitta** is produced; (**Cf. " Vidagdhah aahaarah pittam paribrimhayeta " Su. Soo. A. 46-525. " Vidagdho amli-bhootah " Dalhaana**). The third change into **Katu** begins to take place now, in the intestines " **Pakvasasyantu praaptasya** " and is continued throughout the small intestines until the whole mass assumes a solid consitency (**Paripindita paqua**) and gets a **Katu-bhaava** as a result of which **Vaayu** is produced. These three processes of the change of the six **Rasas** to three, as described by **Charaka** have been called by **Chakrapaani** the three **Avasthaa-paakas** of food.

Vipaaka:—These very changes of the six **Rasas** to three have also been described in general terms by **Charaka** under the head of **Vipaakas**. Four **Gunas** of **Dravyas** are des-

cribed with reference to their effect within the body; viz. [1] **Rasa** which is perceived as soon as the **Dravyas** come in contact with the tongue "**Raso nipaate**" [2] **Vipaaka**: which is known by **Karmanishthaa** (**Karma-parisamaapti–Chakrapaani**), [3] **Veerya**: known by **Yaavadadhivaasaad** (**Ch. Soo. A. 26–66**) and [4] **Prabhaava**: which cannot be explained, it is **Achintya** (**Cha. Soo. A. 26-70**). We may say that **Rasa** is determined by local action by the tongue, **Vipaaka** by alimentary action, **Veerya** by circulatory action and **Prabhaava** by the effect of the particular substances on particular organs of the body or on the body as a whole or by a specific action. According to **Charaka**, **Vipaakaas** are three:-**madhura, amla, katu.** The **Vipaaka** of **Madhura** and **Lavana** is **Madhura**, that of **Amla** is **Amla** and that of **Katu-Tikta-Kashaaya** is **Katu** (**Cha. Soo. A. 26-58**). It comes to this, therefore, that the six **Rasas** are converted to three within the body and hence forward we need consider these three only because the remaining three may be considered to be included in the former; and **Vaagbhata** also says— "**Rasairasau (Vipaakah) Tulyaphalah**" (**As. Sam. Soo. 27**). So, as **Indu** explains, the **Madhura-vipaaka** has properties similar to **Madhura rasa** and therefore it augments **Kapha**. **Amla-vipaaka** has properties similar to **Amla rasa** and therefore primarily augments **Pitta**; similarly **Katu-vipaaka** augments **Vaata**.

Relation between Vipaaka and Avasthaa-paaka :— Now, what is the relation between the three **Vipaakas** and the three **Avasthaapaakas**? The **Vipaakas** of the six **Rasas** take place according to the rule prescribed for them. The **Avasthaa-paakaas** take place in the three successive orders of time and regions. To understand the relation between the two, let us consider a concrete case. Let us suppose that a substance preponderating in one kind of **Rasa** only, say **Tikta** is taken. Its **Vipaaka** will be **Katu** i. e., when its **paaka** will be completed (**paaka-karma-parismaapti**) the **Tikta** will be converted to **Katu** and have the same effect as that of **Katu**. But this change or convertion of **Tikta** to **Katu** will take place

in the third stage of **Avasthaakaaka** in the **Katurasa sthaana** because of the peculiar influence of that particular locality **Sthaana-mahimaa.**

What will be the effect on this **Tikta** substance in the two localities? **Chakrapaani** answers that in the first stage of digestion this **Tiktadravya** will also produce the sweet **Kapha** but in a very minute quantity (**Stokamaatram**). This is easier to understand if we remember that all **Dravyas** are **Paanchabhautika** and there is no **Dravya** with only one **Rasa,** "**Naikarasam dravyam**" (**As. Sam. Soo. A. 27**). Similarly, this substance, though prepondering in the **Tiktarasa** will produce a small quantity of the sour **Pitta** in the second stage.' Its proper and main action will not, however be taken up by the body first, but will be delayed or inhibited until it reaches the third stage when it will produce a large quantity of **Katu-Vaayu** because its **Gunas** are not antagonistic but similar to those of **Vaayu.** And this is the **Swabhaava** of the body. So, we see that the **Vipaakas** are described with reference to the conversion of six **Rasas** to the three and the **Avasthaa-paakas** into that of the time and region of production of respectively **Kapha, Pitta, Vaata.** Both represent the same process described from two different aspects. The three **Vipaakas** or the three **Avasthaa-paakas** together constitute the **Nisthaapaaka** of the **Shadrasas'.**

Who digests the food?—The question as to by whom are these changes brought about still remains unanswered. We do not get any direct answer from **Charaka. Bhela** has raised the same question,— "**Athaatra prashno bhavati, Koatra Khalvasyaahaaram pachati, Vaatah Pittam Sleshma anupaanam Veti? Netyaaha Bhagwan Punarvasu Aatreyah**" (**Bhel. Sha. A. 4**).

The answer given is that it is the **Ushmaa and Tejah** in the body ("**Sareerastha,**" is it "**Dosha-dhaatu-malastha?**") which digest the food. **Vaagbhata II** has also attempted an answer.

According to him, the change i. e., the **Rasaantara** is produced by the **Samyoga** of **Jatharaagni (As. Her. Soo. A. 6–20).**

This description is rather vague, because we are not told how this **yoga** i. e., combination or union (**Samslesha**) according to the **Aruna**, of the **Jatharaagni** with the **Shadrasa** really takes place. But from the different descriptions given in the texts and from what we actually see or find out by experiments we can come to some reasonable conclusions regarding the actual bodily agents which bring about these changes in the food materials i. e., in the six **Rasas.**

Let us consider again the first stage in these changes. The first **avasthaapaaka** as **Chakrapaani** calls it; we know [1] that the first change is that into **Madhurabhaava** and it produces or increases **Kapha.** We also know [2] that it is a set of three **Rasas—Madhura, amla, lavana** that can augment **Kapha,** of the three it is **Madhura** which increased **Kapha** most. And here we may consider the **Madhura Vipaaka** only. We further know [3] that it is only when there is a combination of **Rasa** and **Dosha** within the body (**Rasadosha Sannipaata**) that a **Rasa** can increse a **Dosha.** So in order that the **Madhura-vipaaka** may increase **Kapha**, the **Rasas** concerned must come in contact, we should say intimate contact, with that particular **Dosha.** So, we must conceive of the presence of some **Kapha** in that part of the alimentary canal, where the first **Avasthaapaaka** takes place. We may say either that it is always sure to meet the **Shadrasa** or we may think of some additional quantity of **Kapha**-substance coming out from within the body to mix with the six **Rasas.** In deciding as to which of these two views is the correct one, we must remember that this **Kapha** has to break up the compactness of the food particles, that is to say enter into the six **Rasas** which along with ten other **Gunas** are considered as so many **Avayavas** of the **Aahaara-dravya.** Remembering this we see that the first alternative is at once ruled out, because, although there is some slight **Kapha** remaining always in the mouth and stomach to moisten them, this is not at all

sufficient to moisten the large amount of food that we take every day. Even if we persist that it is this small quantity of **Kapha** which imports the **Madhura-bhaava** to food, it is evident that this **Kapha** will be totally exhausted in dealing with a particular in-take of food and it has to be replenished by a fresh supply and that can come only from within the body, i. e., must be secreted. We come to the definite conclusion then, that there is a **Sleshmic** secretion at the time of the first stage of digestion. This can be actually seen when we take any food and begin to chew it, when a profuse secretion of slimy **Kapha**-like substance does come out and mix with the food. That there is a secretion in the stomach also when a bolus of food reaches it, has been proved by actual experiments by modern scientists and any **Aayurvedic** scholar is at perfect liberty to repeat those experiments and satisfy himself about this fact. I would go further and say that experiments conducted in these lines by research workers with the special view-points of **Aayurveda** in their minds would throw much light upon the nature and properties of the **Tridhaatu**, because these secretions are, as we have said, the **Sthoola** forms of **Tridhaatu.** **Susruta** has given a limit regarding the secretion of **Kapha** when he says that in the **Aamaashaya** the food becomes moistened (**Praklinna**) and broken up (**Bhinna-sanghaata**) by the **Udagg-unas** and because of these **Udag-gunaas** and **Maadhurya, pichhilatva** and **prakley-ditva**, the sweet **Kapha** is generated (**Sambhavati**) there (**Su. Soo. A. 1–12/Ch. Chi. A. 25–26**). What is true for **Kapha** holds true also for **Pitta** in the **Pitta-sthaana** and for **Vaata**, in its own special place in the **Paquaashaya.** It has been proved by actual experiments now, that there are really secretions in these parts of the alimentary canal during the digestive process.

Rasa-vipaakasthaanas:—Chakrapaani says that the appearance of the **Udag-gunas** in that particular place is, because, of the influence of that locality, "**Aashaye chaudag-gunaavir-bhaavaudaka Sleshma-adhaaraa-maashaya mahimnaa" Bhaanu-mati** (**Su. Soo. A. 22–23**). So we see that the order followed in the three **Avasthaa-paakas** and production therefrom of

Kapha-Pitta-Vaata respectively as well as the coincidence of the term **Vipaakas** with the three predominent **Rasas** of the three **Doshsas** are not accidental. It is because the **Shadrasas** in their onward course in the alimentary canal, have to come first to the **Kaphasthaana** which may as well be conceived as **Madhurarasasthaana**, **Madhura** being the predominent **Rasa** of **Kapha**, that the **Sleshmic** secretion takes place there. And because this sweet **Kapha** secretion has to mix up thoroughly with the six **Rasas** in order to break up the **Rasaavayavas** that the **Madhurabhaava** is imparted to the whole and thereby **Kapha** is augmented. So also in the case of **Pitta** and **Vaata.** The existance of three **Rasasthaanas** in this successive order in the three portions of the alimentary canal is due to **Svabhaava.** The **Kapha**, **Pitta**, **Vaata.sthaanas** may also be taken to be the places respectively of **Madhura.amla.katu Rasas.** This fact that there are only three **Vipaakas** has been mentioned in very clear language by an author quoted by **Chakrapaani**—

I "**Madhuro Hridayaadurdhvam rasah kosthe Vyavasthitah.**
Tatah Samvardhate sleshmaa Sareerabalavardhanah.

II **Naabhi Hridayamadhye cha rasastvamlo vyavasthitah.**
Swabhaavena Manushyaanaam tatah Pittam Vivardhate.

III **Adho naabhyaastu khalvekah katuko.avasthito rasah.**
Praayah sreshta.tamastatra Praaninaam vardhate.anilah.
Tasmaad.vipaakas-trividho rasaanaam Naatra Samsayah."

—**Chakratika. Cha. Chi. A. 25/6-22.**

These three **Rasas** found within the **Mahaasrotas** must be considered as of a different nature from the **Shadrasas** found outside, which may be called the chemical **Rasas,** so to say, whereas the former may be called biological. It may be noted here in passing that these secretions of **Slaishmika, Paittika** and **Vaatika** substances are being stimulated by the action of body-**Vaayu** through difierent **Vaata.yantras** (the nerve centres).

CHAPTER VII

The Mechanism of Rasa–Transformation

(Shad - Rasaat Tridhaatootpatti - Vidhih)

Having thus established that during the three successive stages of digestion, there are **Slaishmika**, **Paittika** and **Vaatika** secretions which impart respectively the **Madhura bhaava**, **Amla-bhaava** and **Katu-bhaava** to the **Shadrasas**, let us now finally see how this is actually being done. The **Shadrasas** have been considered as **Paanchabhautika**, so also are the **Tri.doshas** each having different proportions of the five **Bhootas**. The **Kapha** has its own **Paanchabhautika** pattern, so have **Pitta** and **Vaata**. The food materials have also their own respective **Paanchabhautika** patterns. When the secreted **Slaishmika** substance comes in contact with and attacks the **Shadrasas**, it breaks up and softens (**Cf.** " **Dravair bhinna-sanghaatam Snehenamridutaam gatam** " — **Ch. Chi. A. 25-6**), the mass, thus changing the physical appearance (**Roopaantara**) of the whole. But, being part of a living body, the **Slaishmika** substance has an active principle in it, which we call its **Agni** (**Cf. Bhel. Shaa. A. 4**), and due to this **Kaphoshmaa** or **Kaphaagni**, this **Slaishmika** secretion has the additional power of bringing about internal changes in the very structures of the food-stuffs, so effecting the **Rasaantara** (chemical change). We may conceive the **Paanchabhautika** patterns of the food-materials being demolished and then again synthesized into a different pattern (**Dravyaantara**) corresponding to that of **Kapha**. In other words, the secreted **Kapha**-matter has made some portion of the food its very own (**Saatmeekrit, Cf. A. Sam. Sa. A. 6**), i.e., has eaten it up and become itself **Paripushta**. The **Agni** of the **Kapha** substance is however, comparitively feeble. So, it connot bring about all the changes in the **Shadrasa** required. The changing process (the **Shadrasa-parinaama**) thus beginning in the mouth goes on and in the next

stage the very active **Paittika** secretion, with the most powerful **Agni** activities, attacks i. e., begins to eat up the **Shadrasas** which have already been partially digested (**Cf.** " **Avidagdhah Aahaarah"— Su. Soo. 46–525**) by the **Slaishmika** secretion. Next comes the turn of the **Vaatika**-substance to feed upon whatever remains of the **Shadrasa**. Thus—the **Paaka** of the food is completed, i. e., all its **Saara** part is extracted "**Samyag-vipaquo-nissaara Aahaarah**" (**Su. Soo. A. 40–525**) by the **Tridhaatu.**

And here also, in the case of the description of **Paaka-karma**, we have three different versions : [1] in the popular or **Laukika** language, namely that the food is cooked by the abdominal fire with the help of **Kapha** and **Vaayu**, just as anything is cooked outside the body by an ordinary fire (**Cha. Chi. A. 25–68**), [2] in the **Paanchabhautika** or **Daarsanika** language, that the five **Bhootaagnis** belonging to the five **Bhautika** constituents of the body digest the corresponding parts of, the **Paanchabhautika** food (**Ch. Chi. A. 25–22**), and [3] in the **Paaribhaashika Aayurvedic** language, namely the transformation of the six **Rasas** to three **Doshas** effected respectively by the **Kaphaagni**, **Pittaagni** and **Vaataagni**. These three versions are the descriptions of the same process of digestion in the body only from different view-points and so if we impose one upon the other or mix them up together, there is bound to be great confusion, therefore, in any really **Aayurvedic** exposition, we must stick to the third scientific version only.

We thus see that, of the three groups of **Deha-Dhaatus,** it is the **Dosha**-group which comes in direct contact with the **Shadrasa** and is the first to be nourished by them. In fact, it is the **Kapha, Pitta, Vaata** substances that come out, as if hungry, from within the body into the **Maahaasrotas** to eat up the **Shadrasas** and it is by this eating-up-process that the **Shadrasas** are converted into a (**Dhaatu**) form suitable for absorption by the body which is **Dosha-Dhaatu-Mala Samudaaya.** It is the **Tridhaatu**, which one by one consume the **Shadrasas** i. e., extract their **Saara,** so that later on they themselves may be able to feed the seven **Dhaatus.**

The Real Paakakartaa :— Here, it will not be quite unprofitable to transgress for a very short while into the realms of metaphysics. When we say that the body eats food, it means, according to **Aayurveda** that the **Tridhaatus** eat the six **Rasas**. But, who is the real **Kartaa** of this **Bhojanakriyaa**. To that there is only one answer. It is the **Atman**. So, when I say, I eat, I hear, I see, I go, it ordinarily means that the **Aatman** residing in the body does all these things. But, when the subject is considered in detail, science says that the **Aatman** does these through some intermediaries, or some **Karanas** or instruments. These **Karanas** of the **Aatman** are the eleven **Indriyas.** That is the explanation given by the Hindu Philosophy. **Aayurveda** has, however, adopted a different method. By it, all the **Karma** or functions of the body i. e., of the eleven **Indriyas** have been attributed to **Vaayu**, **Pitta** and **Kapha** (**Cf, Cha. Soo. A.22).** To the Aayurvedist, it is the **Tridhaatus** which are the **Karanas** for the **Aatman**. But the usual practice is to attribute the **Kartritva** of the **Aatman** to the **Karanas** themselves. This is, of course, in a secondary or **Aupachaarika** sense. It is called **Bhaktaa Kartritva**. Therefore, when it is said that the **Aatman** eats the food, it means that it is the **Tridhaatus** the instruments of the **Aatman** in any body which eat the food.

The Rejected portion of the Food :— The **Kapha**, **Pitta**, **Vaata**, however, cannot eat up the whole food because, the human body (composed of the **Tridhaatu**) can utilise certain parts only of the **Shadrasas**. They have, therefore to reject that portion of food which they have no power to assimilate. So, at the end of their successive actions (**Bhojan Kriya**), the **Shadrasa** as such disappears and the **Paripushta Tridhaatu** together with the rejected matter take their place. No other part of the **Shadrasa** remains now to be digested or be eaten up. Because, there is no, and cannot be any fourth **Avasthaapaaka** or a fourth **Vipaaka** in the alimentary canal. So, what we call the **Paaka.kriyaa** of **Shadrasa** is but the **Bhojana.kriyaa** of the **Tridhaatu** in the **Mahasrotas**. All the **Saara** parts have been separated and assimilated by the **Tridhaatu**, the food has become **Nissaara** as **Susruta** says "**Nirgata-saara-Daihaana**" (**Su. Soo. A. 46–525**), or "**Paripinditapaqua**" as **Charaka** says.

The **Saara** part of **Anna** is ordinarily called **Aahaara-rasa** or **Anna-rasa** which as we now see is nothing but a conjunction of the **Paripushta Tridhaatu,— "Tridhaatu samudaaya eva Aahaara-rasah"**. As soon as the **Kapha**-augmentation proceeds in the first stage of digestion in so called **Kaphaasaya**, we may conceive that the freshly formed or fattened **Kapha** begins to be absorbed to a small extent there, but practically the whole of the augmented **Kapha** goes forwards along with the partially digested food (**Avidagdhah Aahaarah**) to be joined later on by the augmented **Pitta** which latter may similarly be conceived to be absorbed to a small extent in its place of production (**Pittaasaya**). Both the **Madhura** and **Amla Vipaaka** go forward as the **Vidagdha Aahaara** and as soon as **Vaata** or **Katu Vipaaka** begins to be formed, the three **Vipaakas** physically combined together "(**Samyagvipaqua Aahaarah**)" as **Aahaara-rasa**, begin to be wholly absorbed. After the last particle of the **Aahaara-rasa** absorbed, only the solidified "**Paripindita-paqua-nissaara Aahaara**" called "**Pureesha**" in the large intestines remains.

The rejected matter described above includes not only those parts of the broken-up **Shadrasa**, which have not been assimilated by the **Tridhaatu** but also some portion of the **Tridhaatu** themselves, because, as we have said, the **Tridhaatu** had to enter in the very composition of the **Shadrasa** in order to devour them. The rejected matter has been named the **Mala** of **Anna**. This is differentiated into the comparatively solid **Pureesha** (**Annakittam ghanam Sakrit. As. San. Sha. A. 6**), which is left in the alimentary canal to be ultimately thrown out of the body. The **Tridhaatu**-stream in the body (the **Anna-rasa srotah**) further on gives out liquid **Mala** or **Mootra** through the **Mootravaha Srotasas**. Although these **Malas** are rejected matter, we must remember that the **Tridhaatu** themselves have entered into their composition and as such these **Malas** have **Tridhaatu** aspects and have an important place in the economy of human body.

CHAPTER VIII

Nourishing Constituents

(Poshaka - Dhaatutvam)

It is the **Tridhaatus** which nourish the **Sapta-Dhaatus.**—

We have just seen that of the three groups of **Deha-Dhaatus** it is the **Dosha**-group which is nourished by the food first, because it is the three **Doshas** that the six **Rasas** of food come in direct contact, and not with the other **Dhaatus** of the body. We have also proved that it is the **Paripushta Tridhaatu** that together form the **Aahaara-rasa** and it is well known that the **Aahaara-rasa** which has been called the **Poshaka-rasa** by **Chakrapaani**, nourishes the seven **Dhaatus.** The **Tridhaatu – Samudaayaatmaka – Aahaara – rasa** circulates throughout the body, ministering to the particular needs of particular **Dhaatu.** So, we always remember that wherever the term **Aahaara-rasa** or **Anna Paana-rasa** is used, it should be taken as equivalent to **Tridhaatu-samudaaya** supply. If we proceed with this true scientific understanding it will much enhance the importance of the **Tridhaatu**, as it is meant throughout **Aayurveda**, and some of the most complicated physiological (and therefore pathological) process can be suitably explained.

Bhojya – Bhoktaa Sambandh

Rasadhaatu :—It is conceived that the **Aahaara-rasa** first nourishes the **Rasa-Dhaatu, Rasa-Dhaatu** then nourishes the **Rakta-Dhaatu**, and so on. So one becomes food for the next **Dhaatu** and thus the whole body is kept normal, because, all the incessant natural waste of the body is thus being made up. (" **Dhaatavo hi dhaatvaa-haaraah Prakriti-manuvartante** " **Ch. Soo. A. 20-13**). The ordinary food or **Shadrasa** is the food for

Tridhaatu. Besides this, the outside air as well as the five sense objects (Indriyaarthas) serve as food for the Tridhaatu. The following chain gives the relationship as food and consumer between the different Deha-Dhaatus.

BHOJYA (Poshak)	BHOKTA (Poshya)
Shadrasa	Tridhaatu
Paripushta Tridhaatu (Aahaara-rasa, Poshaka-rasa)	Rasa-Dhaatu
Rasa Dhaatu	Rakta Dhaatu
Rakta-Dhaatu	Maamsa Dhaatu
Maamsa-Dhaatu	Meda Dhaatu
Meda-Dhaatu	Asthi Dhaatu
Asthi-Dhaatu	Majja Dhaatu
Majja-Dhaatu	Shukra Dhaatu

There is no discontinuity in this process of nourishment of the whole body which has been described as Dosha-dhaatu-mala-samudaaya. The usual descriptions, however, omit the most vital link in the above chain, namely the direct link between the six Rasas and the Tridoshas. Without going into details, here we may say that whether we take the nourishing Tridhaatu to supply nourishment to the Sapta Dhaatus simultaneously or to Rasa Dhaatu first and then through it to Rakta-Dhaatu and then through Rakta, Maamsa and so on, as given above, the direct link between Shadrasa and Tridhaatu stands. So, after all, it is the Tridhaatu that has to deal directly with the whole living body, whether in health or in disease. So they may be taken to be the Upaadaana of the Sapta-Dhaatus or indeed of the body itself "(Tridhaatumayam eva Sareeram)" just as the body has been described as "Annamaya" i. e., "Shadrasamaya" Cf. "Annamayaa eva dehe sarvebhaavaah" (As. Sa. Sam. A. 6), with their idea in our mind, we can now see the very special significance of Susruta's momentous declaration.—"Vaata Pitta Sleshmaana eva Deha-sambhavah haetavah" (Su. Soo. A. 23–3).

It will be interesting now to discuss the method by which the nourishment of different parts of the body is effected by the " **Annarasa-roopa Paripushta Tridhaatu Kanas.**"

The texts of **Charaka**, **Susruta** and **Vaagbhata** give us descriptions of two different methods :—

[1] That the nourishing material **Annarasa** i. e., **Tri-dhaatu Kanas** gives direct or **Saakshaat** nourishment to the seven **Dhaatus**, simultaneously at all parts of the body ; and

[2] That the **Anna rasa roopa Tridhaatu** nourishes the **Rasa-Dhaatu** first. The **Rasa Dhaatu** then nourishes the **Rakta Dhaatu**, **Rakta** then nourishes the next **Dhaatu Maamsa**, and so on. So, the nourishment given by **Anna-rasa** to **Rakta** and the other five **Dhaatus** is indirect.

CHAPTER IX

Tridhaatus Nourish Saptadhaatus

(Tridhaatubhis - Saptadhaatu – Paripushti)

That there is an incessant (**Ajasram**) circulation (**Vikshepa**) of the **Annarasa** simultaneously (**Yugapad**) in all directions throughout the body (**Sarvatah**) is described by **Charaka (Cf. Su. Soo. A. 24–3)** and **(Su. Soo. A. 40–532).**

> " **Vyaanena rasadhaaturhi Vikshepo-chita Karmanaa**
> **Yugapada sarvato-ajasram dehe Vikshipyate sadaa."**
>
> **— Ch. Chi. A. 25-36.**

That the **Rasa-Dhaatu** mentioned above is **Annarasa**, is implied by **Chakrapaani** in the course of introducing this stanza for explanation, he says,— " **Atha ko-anna-rasam raktaadi dhaatu-poshakam prerayati yen tatra tatra rasaah sarpateetyaah."**

Aahaara-Rasa :— Again, **Charaka** explicitly mentions **Aahaara rasa** as the nourisher of all the **Dhaatus** and **Avayavas** of the body,— " **Pushyanti ahaararasaad, rasa-rudhira-maamsa-medosthi-majja-sukraujaamsi panchendriya–dravyaani–dhaatu–prasaada – samjnakaani sareerasandhibandh – picchaadayascha-avayavaah." (Ch. Su. A. 20-2)**

Susruta also says,—" **Tatraishaam Sarvadhaatunaam anna-paana Rasa preenayitaa." (Su. Soot. A. 24–22).**

Kedaara Kulyaanaaya :— Now, the seven **Dhaatus** are limited in their extent within their respective **Srotasas.** We may campare them to so many different fields of different

varieties of crops. One is say, a paddy field, one is say of wheat, one of gram, another of potato, another of plantain and so on. Let us suppose that all these fields are watered by the same common tank through a system of channels, big and small, we may suppose, the water to be carried to each field by the bigger channels and then the channels to be branched off and spread into each field, water being carried to the very roots of each individual plant in a particular field by the smaller channels (**Cf. "Sareeramaaraama iva Jalahaarinibhih kedaariva kulyaabhih" Su. Sa. A. 7–3**). In the same way the nourishing material, the **Tridosha** is being brought to even the minutest part of each **Dhaatu** stationed within its own boundary (**Kedaarkulya-nyaaya**). And just as the field which is nearest to the tank gets its supply of water first, so the **Rasavaha Srotasas** being practically contiguous to the **Annavaha srotasas**, where the **Paripushta Tridhaatus** aro being forward, the **Rasa-Dhaatu-Kanas** have to the fitst supply of the **Tridhaatu Kanas**. **Rakta's** turn comes next and so on **Sukra** which is not only remotest from the source of supply but to reach which the **Tridhaatu Kanas** have to pass through very fine channels (**Sookshma** or **Samvrita mukha srotah**). This has been very graphically put forth by **Vaagbhata I** when he describes the direct nourishment of all the **Dhaatus** by **Annarasa—"Rasaleso-abhinivritti samanantaram samam samadhaatushu samavrita asamvritaih pravisrito vivrita mukheshvaasanneshu srotasshu bhooyaan prathamataram chaanveti paryaayenetareshvapi. Evam annarasa eva saakshaat sarvadhaatoon kenachid eva kaalabhedena pushnaati." (As. San. Shaa. A. 6)**

We see, therefore, that it is into the **Rasavaha Srotasas** that the **Paripusta Tridhaatu-kanas** (i. e., **Aahaararasa**) are first poured. There, a portion of these nourishing **Kanas** is utilized to nourish the **Rasa-Dhaatu**, i. e., to make up the natural waste, (**"Tatra annaad utpanno raso dhaaturoopam rasa-madhigamya kiyataa apyansena tam rasam vardhayati"— Chakratika. Cha. Soot. 28–4**). The **Aahaara rasa** goes direct to the heart and then spreading in all directions through the **Dhamanees** nourishes the whole body (**" Kritsnam Sareeram**

tarpayati"—Su. Soo. A. 24–3). So it is through the medium of the **Rasavah Srotasas** (the lymphatic) that the nutrient **Tridhaatu Kanas** have to traverse and reach all the **Avayavas** of the body ("**Sarva-sareera-avayava dosh-dhaatu-malaasaya-anusaari rasah"—Su. Soo. A. 24–3).** And it is then when the **Tridhaatu Kanas** have reached the different **Avayavas** that they can enter the **Srotasas** of other **Dhaatus** and bring nourishment to them. This very fact of the **Tridhaatu (Anna rasa)** nourishing all the **Dhaatus** simultaneously shows that it cannot be anything but a conjunction of the **Tridhaatu** like cotton for cloth, because to nourish all the **Avayavas** of the body, the **Tridhaatu (Anna rasa)** has to enter every **Srotas** in the body of whatever kind and how-so-ever minute it may be. Thus the **Anna rasa** can never do, if we consider it as merely one form of **Rasa Dhaatu,** which can flow only in its own **Srotasas.** It is only the **Vaata, Pitta, Kapha** that can pass through all kinds of **Srotasas,** there being absolutely no restriction in their movements, "**Vaata-Pitta-Sleshmanaam punah sarva-sareera-charaanaam sarvaani srotaamsyayanabhootaani." (Ch. Chi. A. 5–5)**

It is the **Tridhaatu Kanas** only which are fine enough to penetrate into the finest **Srotasas.**

Khale-Kapota Nyaaya :— Coming back to our analogy of the fields, it will be evident that the different varieties of crops in the different fields will require different quantities (and qualities also) of the water. Similarly, the seven **Dhaatus** of the body being different from one another in nature and structure, will evidently require different quantities and qualities of nourishment. One **Dhaatu** e.g, **Medas** may require more of **Kapha Kanas,** another like the **Rakta** may be in need of a greater portion of **Pitta Kanas** and yet another like the **Asthi** must have a large share of the **Vaata Kanas.** It has been so ordained by Nature that each **Dhaatu** really has the power and choice of picking out whatever it requires from the **Tridhaatu-kanas** under circulation. It is like pigeons of different species and of different growth coming from different directions and flocking at the same time to a farm-house

each requiring different quantities (and qualities) of grains and so picking out whatever each may require. **(Khale Kapota Nyaaya)**

Besides the **Rasavah Srotasas**, we may consider another medium also, namely the **Raktavah Srotasas**, as carrier of the nutrient **Tridhaatu Kanas**. In fact, the **Rasa** and **Rakta** being the most liquid **Dhaatus** of the body, their circulations have often been taken as identical. It is these two **Dhaatus** which flow most freely, as **Susruta** says— **"Tatra 'rasa' gatau dhaaturaharahar gacchateetyato rasah" (Su. Soo. A. 24-23). "tena rudhiraadinaamapi dravaanam grahanam bhavati" (Ch. Chl. A. 25-36)**, the same description may equally well be applied to **Rakta**. And **Chakrapaani** says,— **"Rasati iti raso dravadhaatu-ruchyate tena rudhiradee naamapi grahanam Bhavati— Ch Chi. A. 25-36"**, we may call these two, the circulating fluids of the body. Moreover, it is said that the principal receptacle for **Rasa Dhaatu** is the heart and **Susruta** says that the **Anna** first goes there. So the **Rasa** must be mixed up with the **Rakta** at the heart. This means that the two vascular systems are considered as one at certain stages.

Now, the total number of blood vessels has been given as 700, of which one-fourth (i. e., 175) carries **Vaatarakta** and a similar number carry respectively **Pitta-rakta**, **Kapha rakta and Shuddha-rakta,—"Taasaam yethaswam turyaamsavibhaagena panchya saptatyadhikam shatam, anila raktam vahati. Yesha vibhagah Pitta Sleshma Suddha rakteshwapi" (As. Sam. Shaareera. A. 6)**. But the most striking expression by the elder **Vaagbhata** here is that,—thus dirtributed, the **Doshas** nourish the body,— **"Sthitaa hyevam deham anugrihnanti doshaah" (ibid)**. The places where the main branches of the **"Anila-raktaVaha, Pitta-raktavaha and Sleshma-raktavaha Shiras"** are to be found are the respective special seats of **Vaata, Pitta, Kapha** in the body. **(Su. Sha. A. 7-6)**. The **Suddha-raktavaha Siras** are to be found in the liver and spleen which have been described as the receptacles of **Rakta**, where **Suddha Rakta** is being formed. So the **Suddharakta-vaha Siras** may be considered as outside the general circulation.

It is, therefore, in the general circulation **Rakta** predominating in one or the other of the free **Tridhaatu Kanas** is to be found.

If we take the **Anna-rasa** to be equivalent to **Tridhaatu Kanas** we can very rationally explain the existance of the **Anilaadi vaha** blood-vessels. The nutrient **Tridhaatu Kanas** are being formed in the intestines and they are being slowly absorbed by the action of body-**Vaayu**, (one of the functions of **Vaayu** being **Dosha Samsoshana—Ch. Su. A. 22–8**), and **Soshana** means **Rasaa-karshana**. This absorption takes place through two systems of channels. One portion of the **Tridhaatu Kanas** is absorbed through villi and lymphatic vessels and poured into the heart by the Thoracic duct. Ultimately this reaches the liver-spleen. The remaining portion of the **Tridhaatu Kanas** is absorbed through the mesenteric veins and also reaches the liver. In course of branching out of the **Rakta Srotasas**, we may conceive the **Tridhaatu Kanas** to be distributed to different sets of **Siraas** in different functions. It is evident that the places which have been described as special seats of **Vaayu**, i. e., where **Vaata-yantras**, the various nerve centres are to be found in large numbers will naturally require more of the **Vaata Kanas** from the **Anna rasa** than of the other two **Kanas**. So the main branches of **Srotasas** carrying **Anila-rakta** i. e., **Rakta** in which **Vaata**-particles predominate will be found in these **Vaata sthaanas**. Similarly for **Pitta-rakta** and **Kapha-rakta**.

It is quite clear that the above description by **Vaagbhata I** is not pathological, it is the description of a pure physiological process, otherwise the term **Anugrihnanti** could never have been used. It is the importance of the **Tridhaatu**-supply to the body that has led the **Aayurvedists** to set apart 3/4 of the total blood-vessels for the purpose of conveying the nutrition of food, in the form of **Paripushta Tridhaatu**, to the different **Avayavas** of the body.

The **Deha-Dhaatus** may be conceived as chemical compounds so to say, made up of the elemental substances **Vaata**-

Pitta-Kapha; the **Tridhaatu** here are fixed in these organised **Dhaatus** in some definite proportions. The **Anna rasa** on the other hand, may be conceived as being a physical mixture of the **Vaata-Pitta-Kapha**; the **Tridhaatu Kanas** here are fixed in these organised **Dhaatus** in some definite proportion. The **Anna rasa** on the other hand may be conceived as being physical mixture of the **Vaata-Pitta-Kapha Kanas**; the **Tridhaatus** here are comparatively free. So when these latter are in circulation, the different **Dhaatu-kanas** (including the organised **Tridhaatu**-bodies in the **Vaata-Pitta.Kapha yantras**) can easily take up whatever proportion of the free **Tridhaatu Kanas** each may require. In the general circulation, the **Rasa Kanas** and the **Rakta Kanas** may be said to be floating in a sea of free **Tri-dhaatu Kanas.** But remembering that "as the blood circulates through the capillaries, some of its liquid constituents (i.e., the lymph) exude through the thin walls of these vessels, carrying nutrient and oxygen to the tissue cells", we see that the ultimate material which nourishes the **Dhaatus** is always **Anna rasa** i. e., the **Parīpushta Tridhaatu.**

CHAPTER X

Indirect Nourishment of the Dhaatus by Anna – Rasa

(Anna - rasaih Kramasah Dhaatu - Pushti)

The conception of these two different methods of nourishment of the body is a special characteristic of **Aayurveda.** The language used by **Charaka** and **Susruta** is practically the same.

> " Rasaadraktam tato maamsam –
> maamsaanmeda-stato sthicha,
> Asthno majjaa tatah sukram –
> sukraad garbhah prasaadajah ".
>
> — Ch. Chi. A. 25-26.

The **Poshaka Tridhaatus** are first added to **Rasa Dhaatu** then produce, i. e., nourish the **Rakta** and so on. The whole process from **Rasa Dhaatu** to **Sukra** takes about one month according to **Susruta**, the **Aahaara rasa** staying, it is said, for about 5 days in each of the six **Dhaatus** beginning from **Rakta.** (**Su. Soo. A. 24-24**).

I do not want to go into details about this method. But I think these two processes of direct and indirect nourishment go on simultaneouly in the body. One is a day to-day process **(Aaharahah)** the other is a much slower process. There is no doubt that not only is there a direct relation beetween the circulating **Poshaka Tridhaatu Kana** and the different **Deha-Dhaatus**, but there are also direct links between the **Dhaatus** themselves. The **Maamsa Dhaatu** for example, is intimately connected with the **Medas Dhaatu** by **Medovaha Sro-**

tasas, the **Medas** is connected with the next **Dhaatu**, **Asthi** by **Asthivaha Srotasas** and so on, and it is through their own respective **Srotasas** that one **Dhaatu** is being nourished by the previous **Dhaatu**,— "**Srotasaacha yathaa swena dhaatu pushyati dhaatunaa**" **(Ch. Chi. A. 8–36; Cf. Ch. Soo. A. 28–5).**

Moola-dhaatutvam, Kaarana-dhaatutvam vaa:— It is the **Tridhaatus** which are the **Upaadaanas** of all the other **Dhaatus.**

We have seen that the **Aahaara rasa** nourishes all the **Dhaatus**, whether directly or indirectly. It is also said that it is the **Kshaya Vriddhi** of this **Anna rasa** that causes corresponding **Kshaya vriddhi** in the **Dhaatus**. This it cannot do unless the **Anna rasa** is taken to be the **Samavaayee Kaarana** of the **Sapta-Dhaatus.** But as we have proved that **Anna-rasa** is equivalent to **Tridhaatu**, we come to the definite conclusion that **Vaata-Pitta-Kapha** themselves are **Upaadaana Kaaranas** of the **Sapta Dahatus.** And therefore it is the **Tridhaatus** which form the basis of the **Prakritis.**

Swatah Kriyaavatvam, Swatah Dushti Kartritvam cha:— Of all the **13 Deha Dhaatus**, it is the **Tridoshas** that have independent actions in the body. They are **Swatantra** (independent) the other **Dhaatus** are **Paratantra** (dependent) for their action on the **Tridhaatu.**

[We are here, of course, not considering the primordial cause of all actions of the body, as of all actions in the universe, namely the **Chaitanya.**]

That each individual **Dosha** can act independently of any other **Dosha** or **Dhaatu** is explicitly given out by **Chakrapaani**, —"**Na Vaataadayo vriddhaah kinchidapekshya dooshyyanti, kintu swata eva**" **(Ch. Soot. A. 2–57).** Although **Kapha** and **Pitta** are said to be **Pangu** that refers to their being unable to move from one place to another without the help of **Vaayu.** But remaining in their own respective places they can act, e.g. produce heat or coldness etc. The other **Dhaatus** have no such independent action.

Baahya Padaartha Grahana Yogyatvam :— The **Tridhaatus** have the special power of gathering outside matter and adopting them for proper use in the body. This they do in three ways.

[1] Through food; the **Tridhaatus** assimilate the **Saara** parts of food.,

[2] Through respiration; by the action of **Praana-Vaayu** the outside atmospheric air is drawn in and made use of for the proper maintenance of the active functions of the body.

[3] Through the senses; the **Tridhaatus** gather in or receive the different sense-objects (**Indriyaarthas**).

Sarva Sareera-charatvam, Sarva Srotonugaamitvam cha :— The **Tridhaatus**, of all the **Deha Dhaatus**, have the power of going through all the **Srotasas** of the body. This we have already spoken of. (**Ch. Soo. 20–6 ; Ch. Chi. 5–5**).

Antar-mukhatvam :— The **Tridhaatus** are the in-coming **Dhaatus.** They are being nourished or replenished from outside. They have a natural tendency to always go in and nourish other **Dhaatus.**

Sahaja Saatmyatvam :— Although the three **Doshas** have the properties which are antogonistic to another, yet they do not destroy each other, because they are originated together, at the same time and so function peacefully side by side " **Viruddhairapi Natvete gunairghnanti Parasparam. Doshaah Sahaja Saatmyatvaad visham ghoramaheenIva". (Ch. Chi. 26–263).** Compare :— Modern physiology speaks of internal secretions like Adrenalin and Pitutrin antagonistic to each other but co-existing in the body. It is their **Swabhaava.**

CHAPTER XI

The Nervous System

(Vaata - Yantra - Pranaali)

We have seen that when ordinarily we say that food is digested by the body, it really means that the food is digested i. e., eaten up by the secreted and **Apachita** or **Ksheena Kapha-Pitta-Vaata** of the body. This is done in three successive stages in the alimentary canal. The **Upachita** or **Paripushta Tridhaatus** thus formed out of the digestion of food combine together and constitute what is commonly known as **Aahaara-rasa** or **Anna-rasa**. For want of better term, we shall call this **Anna-rasa**, the **Tridhaatus** stream which flows through the body. And it is the circulating **Tridhaatus** in the **Tridhaatu** stream, which minister to the needs of individual **Deha-Dhaatus**, including the **Sthaayee** or stationery (and therefore **Poshya**) **Tridhaatus** themselves. So, it is these circulating **Tridhaatus** which really are the only original nourishers—the **Moola Poshaka Dhaatus**—of the body. We shall now see how the idea of the **Tridhaatu** stream becomes of very great practical value in understanding the workings of the body, which after all mean the physiological functions of the **Tridhaatus**. As an instance, we shall take up the case of the most complicated and highly organised system of the human body, viz., the Nervous System.

According to modern physiology, the activities of all parts of the body are controlled by the nervous system which consists of a series of nerve-cells. These nerve-cells generally send out tendrils or processes, short or long, the ends of which are attached to different organs of the body. One nerve cell may have one or more such tendrils. In **Aayurvedic** language, we may say that these nerve-cells are miniature **Vaata-Yantras**. These go to form the small, medium sized or

big **Yantras** or apparatus belonging to the whole nervous system. They may be called the specialised seats of **Vaayu** which has been described as **Tantra yantradhara** by **Charaka** (**Soo. A. 22**). All actions of the body are regulated by the supply of **Vaata**-matter i. e., all nervous action is based on and is regulated by the supply of **Vaata** particles as its nutrition.

The **Vaata**-matter is not **Vaayu** alone, but a combination of **Vaata, Pitta, Kapha** with the **Vaata** part preponderating greatly. We may conceive of the **Vaata-Yantras** as specially organised bodies as other **Dhaatus** formed by the combination of the **Tridhaatu** with **Vaata**-matter predominating.

In common with all other cells of the body, the **Vaata-Yantras** also are nourished, as we have said, by the circulating **Tridhaatus**. But these cells being made up principally of **Vaata**-substance will naturally and of necessity take up very much more of the **Vaata** particles than of **Pitta** or **Kapha** from the **Tridhaatu**-stream in order to keep up their proper consistancy and sustain the ability for their particularly specialised work. It is evident, therefore that the proper functioning of these **Vaata-Yantras** (Nerve-cell) will depend very materially on the nature of the nourishment they get, i. e , on the nature of the **Vaata** particles of the **Tridhaatu**-stream, or in other words, on the nature of the **Vaata**-substances produced in the intestines during the third **Avasthaa-paaka**. So, we may say not only that the **Vaayu** which is produced in the intestines is the source or root of all other **Vaayus** of the body, but also that it is primarily on this **Vaata**-matter that will depend all **Vaata**-activities of the body. So, if this **Vaata**-matter in the intestines is well formed, all the **Vaata Yantras** will continue in their perfect normal state. **(Cf Ch. Soo. A. 20)**

Let us now take the case of the circulating channels—the blood-vessels and lymphatics. This vascular system is one of the most important, because it is through these vessels or channels that the **Tridhaatu Kanas** are being circulated and supplied to different parts of the body. The ends of the nerve tendrils are attached to the walls of the channels and

the **Vaata**-matter supplied to the nerve cells controls the contraction or dilatation, as required, of the channels through the nerve endings. On this contraction or dilatation will depend the velocity of flow of the **Tridhaatu** stream through the channel and the volume of the liquid **Dhaatu**-material allowed to pass through any particular portion of the channel. In this way, the amount of nourishment to be supplied to a particular part or organ of the body as required by it at that particular moment is regulated. And, as we have said, this action is controlled by the **Vaata**-action from outside the channel.

There are also **Vaata** particles in the **Tridhaatu**-stream flowing in the channel. They have also independent mechanical action. They can, for example, bring about changes on the walls of the vessels by pressure from inside. We see, therefore, that there are two sets of **Vaata**-actions going on simultaneously in every part of the body, one from inside which is physical and the other from outside which is biological—the two actions being interdependant.

To take another concrete example of the action of the vessels. Say, a muscle has to work (**Cheshta** of the muscle), i. e., the muscle fibers have to contract, i. e., expend some energy. So the muscle will require additional nourishment and the **Tridhaatu**-supply has to be regulated, in this case augmented, accordingly. The contraction of the muscle is controlled by the nerves whose endings are attached thereto. This is the **Cheshtaa-pravartaka** function of **Vaata**-matter, through the particular **Vaata–Yantra** or group of Nerve-cells connected with that muscle.

Then again, "**Sameeranogneh**" (**Ch. Soo. A. 22**) i. e., **Vaayu** stimulates the **Agni karmas** of the body. Supposing a gland is required to pour out its secretions in the alimentary canal. It was in a quiescent state, so to say, at first and then brought into activity. Its supply of nutrients (i. e., the **Poshaka Tridhaatu Kanas**) is at once increased through the action of the **Vaata-Yantra** controlling that part, which action

again depends upon the nature of the circulating **Vaata**-matter of the body ; because, as we have already said, the **Vaata Yantras** get their quota of nutrient materials, with a preponderance of **Vaata**-particles from the **Tridhaatu**-stream. Therefore, we may say that the activities of the entire system of **Vaata Yantras** are controlled by the circulating nutrient **Vaata**–matter. All secretions bring about some chemical change which is described in **Aayurveda** as an **Agni Karma**, so we say that **Vaayu** stimulates the **Agni Karma** of the body.

The **Cheshtaa** in **Cheshtaa Pravartaka** should be ascribed to **Karmendriya Cheshtaa** i. e., motor activities, and **Indriyaa-naamabhivodhaa** should mean the carrier (**Vaahaka**) of the sense objects, viz., **Sabdasparsa etc. Indriyaanaamudyojaka** means stimulator of **Indriyas Cf.** (**Ch. Soo. A. 22**). These are some of the functions of the **Vaata**-matter through the different **Vaata-Yantras**. Ordinarily, in **Aayurveda**, the word **Vaata** denotes [1] **Vaata Dhaatu**, [2] **Vaata Sthaana** and [3] **Vaata Kaarya**. Both increase and dicrease are also described as **Vaata** or **Vaayu**. All the above mentioned meanings are to be understood according to the context.

The **Vaayu Dhaatu** of the body is the **Vaata** particles forming a part of the combined **Tridhaatu** stream, which circulates all over the body supplying the nutrient **Tridhaatu** particles to all parts. In this stream, the **Tridhaatu** particles and so the **Vaata** particles also are free and they are not fixed up (like parts in a chemical compound) with **Pitta** and **Kapha** particles. They are here in a **Sookshma** or **Asanghaata** state and therefore invisible (so are the **Pitta** and **Kapha** particles). The **Vaayu Dhaatu** has been described under five different heads. We have already said that the **Vaata**-matter acts through the **Vaata Yantras** which go to form the different **Vaata Pranaali**. Particular **Vaata Yantras** in particular parts of the body have particular functions to perform and we have five such main departments of **Vaayu**-activities in the body. Thus, the group of **Vaata**-cells or **Vaata Yantras** in the umbilical region has the special function of stimulating the different excretory glands in the lining of the ali-

mentary canal, (the **Kapha**-secreting glands in the mouth and stomach, the **Pitta** secreting glands lower down and the **Vaata**-secreting glands in the intestines) for the purpose of digestion. The function of these particular **Vaata-Yantras** is taken to be the function performed by that part of the circulating **Vaata**-matter which gives **Vaata**-supply to these **Yantras**. A special name **Samaana Vaayu**, has been given to this particular part in the umbilical region of the general **Vaata**-circulation (in the **Tridhaatu**-stream). This particular **Vaata-Yantraa** may be said to be the seat of this special **Vaayu**. The sphere of action of **Samaana Vaayu**, i. e., of the **Vaata-Yantra** getting supply of this **Vaata**-matter is limited within the umbilical region

The elder **Vaagbhata** has described very clearly not only the seat, but also the sphere of activities of the five **Vaayus**, i. e., the five main groups of **Vaata Yantras** (**Asht. Sam. Soo. A. 20**). He says,— "**Tatra praano moordhanyavasthitah kanthorascharah**" the **Praana Vaayu** is situated in the brain and its activities are extended upto the throat and the thorax. Its functions are to sustain the nerves (**Dhamanee Dhaarana**) which control the actions of the heart and of the senses. But its main function is in connection with respiration. We would say that the **Vaata-Yantra** (the group of **Vaata** cells) which regulate all the above actions have their centre at the brain and have different processes extending to the throat and to the lungs and heart. The **Vaata-Yantras** in the brain get their supply of **Vaata** matter (the **Praana** variety) from this **Sirogreevaa** part of the **Vaata** circulation. The activities of this group of **Vaata Yantras** (**Praana-Vaayu Yantra** we may call it) corresponding to the **Praana-Vaayu**-matter (of the **Tridhaatu** stream) are attributed in a secondary sense (**Aupachaarika**) to the **Praana Vaayu** itself, as if the **Praana Vaayu** is acting through the **Vaata Yantras** in the brain.

Similarly, there is group of the **Vaata Yantras** corresponding to **Udaana Vaayu**. Its centre is in the thorasic region (according to **Saarangadhara**, it is the lungs), with activities extended up to the throat and the nose and down to the

umbilicus. Its main function is in connection with speech and voice. The **Vaata Yantras** corresponding to the **Vyaana-Vaayu** have their centre in the heart, with activities extended in all directions throughout the body. It controls circulation and locomotion. The **Vaata Yantras** corresponding the **Apaana Vaayu** are situated in the pelvic region, to which their activities are limited. It controls the main excretory functions.

From what we have said so far, it is evident that we must make a distinction between the **Vaata Yantras** and **Vaata-matter**. The **Vaata Yantras** consist of groups of **Vaata**-cell or cells which are composed of **Vaata-Pitta-Kapha** with a very great preponderance of **Vaata**. It may be considered as an organ, whereas **Vaata**-matter is the circulating **Vaayu-Dhaatu** composing the **Tridhaatu**-stream. But we may conceive of this **Vaayu-Dhaatu** as acting through the **Vaata-Yantra** (i.e. nerve-cells etc.) The activities of these cells are those of the **Vaata**-matter ; the tendrils (processes–dendrils) of the nerve cells are carriers of impulses due to these activities. As the nerve-impules i. e., **Vaata**-impulses are propagated through these nerve fibres, these latter may be called **Vaatavaha Dhamanees**. When such a term as **Mootravaha Dhamani** is used, it means not the vessel or duct which bodily carries the urine, but it refers to the nerve which regulates the flow of urine ("**Yaa Dhamanee Mootram Vaahayati** ").

Like the five main groups of **Vaata-Yantras**, we may also conceive of five **Pitta-Yantras** and five **Kapha-Yantras** where **Pitta**-matter and **Kapha**-matter are respectively congregated together in greater proportion and through which **Pitta** and **Kapha** (the circulating nutrient **Pitta** and **Kapha Dhaatu** of the body) perform their respective special functions.

Note :- Chapter five to eleven both inclusive form the main part of the thesis; because the **Tridhatus**, forming an overwhelmingly prominent subject of Aayurveda, required special treatment. The whole article means to give prominence to **Deha Dhaatus** in general.

CHAPTER XII

Charactaristics of the Dhaatu Group

(Dhaatu Vaisishtyam)

1. **Samsthana-katritvam**:—It is the seven **Dhaatus** which give a definite shape to the body. The structure and firmness of the body depend upon them.

2. **Tridhaatu poshyatvam** :— The **Sapta-Dhaatus** are nourished directly by **Tridhaatus.**

3. **Baladhaatutvam** :—The seven **Dhaatus** are the special stay, **Dhaarakas** of the body.

4. **Satata Parinaama Seelatvam** :— Transformations are always going on in the seven **Dhaatus Cf.** " **Kaalavad anavasthita Dhaatu paakam** " (**Ch. Soo. A. 25-3**).

5. **Swa Srotonu charatvam** :— They are confiined within their respective **Srotasas.** This property is common to both the **Dhaatus** and **Malas.**

Characteristic of Mala Group

(Mala Vaisishtyam)

1. **Bahirmukhatvam** :—The **Malas** have a natural tendency to go out.

CHAPTER XIII

• The five kinds of Vaayu

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[CONTENTS:—The five kinds of vaayu – Functions of abnormal vaayu – Five divisions of vaayu and their functions – functions of abnormal vaayu– Simptoms of vaayu covered by pitha, kapha, etc.– Five functions of vaayu according lo different locations – Eighty kinds of vaayu affactions. The nervous system – Nervous system– Autonomic nerveus system – 27 Sensory nerves – The relation of vaayu to the nervous system – Five kinds of vaayu – Praana vaayu– Samaana vaayu – Apaana vaayu – Vyaana vaayu – Udaana vaayu– Functions of normal vaayu – Fnnctions of abnormal vaayu – Properties of vaayu and vaayu Temperment – Causes for the Derangement of vaayu].

For the purpose of the present study, the material available in the Samhitaas alone has mainly been utilised. A scrutiny of this available material shows evidence of a very rich collection of facts which on closer study reveals the inherent key to the understanding of the Tridosha theory.

A STUDY OF THE INTERNAL EVIDENCE

The internal evidence as found in the Samhitaas, reveals that they, the quotations, can be grouped under the following main heads :—

I The Material Fuuctions of Normal Vaayu
(Prakritistha Vaayoh Karmaani)

Vaayustantrayantra dharah,
Praanodaana samaana vyaana apaanaatmaa,
Pravartakah chestaana muchaavachaanam ,
Niyantaa pranetaa cha manasah,
Sarvendriyaanaamudyojakah,
Sarvendriyaardhaanaamabhivodhaa,
Sarva sareera dhaatuvyooha karah,
Sandhaana karassareerasya,
Pravartako vaachah,

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Prakritih sparsa sabdayoh,
Srotra sparsanayor moolam,
Harshotsaahayor yonih,
Sameeranogneh,
Samsoshano doshaanaam,
Ksheptaa bahirmalaanaam,
Sthoolaanusrotasaam bhetta,
Kartaa garbhaakriteenam.

Ayusho anuvrutti pratyaya bhuto (Hetubhuto) bhavatyauk pitah. * C. S. 12/8.

The Vaayu upholds the constiutents of the body such as blood, flesh, marrow, fat & etc., and their courses through the body. It exists in the fivefold form of Praana, Udaana, Samaana, Vyaana and Apaana. It is the urging cause of movements of diverse kinds.

It restrains the mind (from all undesirable objects) and concentrates it (on objects that are desirable). It causes all the (ten) senses (of knowledge and action) to perform their functions. It bears all the objects of the senses (after contact with the senses) to the mind. It holds together all the elements of the body. It causes speech. It is the prime cause of touch and sound, and the root of scent and touch. It is the origin of joy and cheerfulness. It excites the heat of fire. It dries up all faults. It throws out all impurities. It pierces through all the ducts of the body, gross and fine. It gives form to the embryo in the womb. It furnishes evidence of the existence of life. The Vaayu when unexcited, achieves all these functions.

* In the references from the Samhitas the following abbreviations are used. The first letter, C. S or S. S. or A. H. indicates Charaka Samhita, Susruta Samhita or Astaangahridaya Samhita respectively. The Second letter S, C, V, Sa or N indicates Sutrasthanam, Chikichaasthaanam, Vimaana sthaanam, Saareerasthaanam, or Nidaanasthaanam respectively. The first figure indicates the number of the chapter and the last figure the number of the paragraph.

·Utsaaho chhvaasa niswaasa chestaa dhaatugati ssamaa, Samo moksho gatimataam vaayoh karma avikaarajam. C. S. 18/42.

The following are the acts of the Vaayu when in its normal state, viz., energy in respect of action or movements, inhalation and exhalation of the breath the proper functions of the physical organs (such as speech, thought etc.), the equable course of the several elements of the body, and the equable or proper discharge of excreta and urine and such other impurities as escape or as secreated out of the body.

Sarvaahi chestaa vaatena sa praanah praaninaam matah (smrutah). C. S. 17/115.

All acts and functions are due to Vaayu as their cause. The Vaayu has been called the Life of living creatures.

Praspanda nodvahana poorana viveka dhaarana lakshano vaayuh panchadhaa pravibhaktah sareeram dhaarayati. S. S. 15/3.

The imparting of motion to the body (PRASPAN DANAM), the carrying of the sensations of the respective sense organs (UDVAHANAM), the passing down of food to its proper receptacles (PURANAM), the separation of excretions from the assimilated food matter (VIVEKA), and the retention and evacuation of urine and semen etc. (DHARANAM), should be ascribed to the functions of the five kinds of Vaayu which support the body.

2 Five Divsions of Vaayu and their Functions

(Panchavidha Vaayornaamani saamaanyakarmaanicha)

Praanodaana samaanaakhya vyaa naapaanaih sapancha dhaa, || Deham tantrayate samyak sthaane-shvavyaahatah-scharan.

The five classes of the Vaayu viz., 1 Praana, 2 Udaana, 3 Samaana, 4 Vyaana and 5 Apaana moving unobstructedly in their respective places, fully control the body.

Sthaanam praanasya moor dhorah kantah (karna) jihvaasya naasikaah, || Steevana kshavadhoodgaara swaa. saahaaraadi karmacha.

The seats of the Praana are the head, the thorax (lit the chest), the ears, the tongue, the mouth and the nose. Its functions are spitting, sneezing, eructations, breathing and deglutition (lit the operation of eating), etc.

Udaanasya punah sthaanam naabhyurah kantah evacha, Vaakpravruttih prayatnourjo balavarnaadi karmacha.

The seats of Udaana are (the regions near) the navel, the chest and the throat. Its functions are the utterance of speech, exertions, (the formation of) energy, the strength and the complexion etc.

Sweda doshaambu vaaheeni srotaamsi samadhistitah, Antaragnescha paarswasthah samaanogni balapradah.

The Samaana is located in the ducts that bear sweat, the faults (Vaayu, Pitta and kapha), and the watery juices. It lies by the side of the internal fire. It imparts strength to that fire.

Deham vyaapnoti sarvam tu vyaanus seeghra gatir nrunaam, Gati prasaarana akshepa nimeshaadi kriya ssadaa.

The Vyaana, whose course is very swift, pervades the entire body of human beings. Its functions are locomotion, extending of the limbs, contraction of the same, winking of the eyelids etc.

Vrushanow vasti medhramcha naabhyuroo vamkshanow gudam || Apaana sthaana mantasthah sukra mootra sakrunticha.

Sruja tyaartava garbhow cha yuktaah sthaana sthitaascha te || Swa karma kurvate deho dhaaryate tai ranaamayah. C. C. 28/3-4.

The two testes, the pubic region and the bladder, the male organ, the navel, the thighs, groins, and the anal canal are the seats of Apaana. Seated in the intestines, it (secretes and) expels the vital seed, the urine, and the stools. It is this Vaayu that also expels menstrual blood and the foetus (from the womb).

The five Vaayus, dwelling in their respective seats, and combined with one another, discharge their respective functions. They uphold the body, keeping it in a healthy condition.

Yadhaagnih panchadhaa bhinno naama sthaanaatma karmabhih || Bhinnonilastadhaa hyeko naama sthaana kriyaa mayaih. S. N. 1-7.

Praano daanow samaanascha vyaanaschaapaana evacha Sthaanasthaa maarutaah pancha yaapayanti sareerinam. S. N. 1-8,

The bodily Vaayu, like the Pittam in the organism, is grouped under five different subheads according to the difference in its functions and locations, and is classified as the Praana, Udaana, Samaana Vyaana and Apaana. These five classes of Vaayu located in their specific regions, contribute towards the integration and maintainance of the body.

Vaayur yo vakthrasanchaaree sa praanonaama dehadhruk, Sonnam pravesayatyanthah praanaaschaa yavalambate, Praayasah kurute dushto hikka swaasaa dikaan gadaan. S. N. 1-9.

THE PRAANA VAAYU:—The Vaayu, that courses in (governs) the cavity of the mouth, is called the Praana, its function being to force down the food into the cavity of the stomach, and to assist the

different vitalising principles of the body (such as the internal heat or fire etc.,) in dischaging their functions in life, and to contribute to the general sustenance of the body. A deranged condition of this particular kind of Vaayu (Praana) is usually followed by hic-cough, dyspnoea and other kindred distempers.

Udaano naama Jatoordhvam upaiti pavanotta mah' Tenabhaashita· geetaadi viseshobhipravartate || Oordhvajatru gadaan rogaan karoti cha viseshatah. S. N. 1·10.

THE UDAANA VAAYU:—The most important of the vital Vaayus, which courses (sends its vibrations) upward, is called the Udaana. It produces speech, song, etc., In its deranged state it brings on diseases which are specifically confined to regions lying above the clavicles.

Aama pakwaasaya charah samaano vahni sangatah, Sonnam pachati tajaamascha viseshaan vivinaktihi || Gul. maagnisang ateesaaraprabruteen kurute gadaan. S. N. 1 11.

THE SAMAANA VAAYU:—The Samaana Vaayu courses in (governs) the stomach (Aamaashaya) and in the region of intestines (Pakvaashaya). Its functions consist in digesting the chyme brought down into the intestines in unision with the digestive ferment (Agni), and especially in disintegrating its essence from its refuse or excreted mattar. A deranged or aggravated condition of Samaana Vaayu causes dysentry, gulma, and impaired digestions.

Krutsna deha charo vyaano rasa samvahano dyatah, Swedaasruk sraavano vaapi panchadhaa chesta ya- tyapi, Krudhaschet kurute rogaan praayasah sasarva deha gaan, S. N. 12.

THE VYAANA VAAYU:—The Vaayu known as the Vyaana courses (acts) through the whole organism, and its functions consist in sending the lymph

chyle etc ; all through the body and in helping the out-flow of blood (Asrik) and perspiration. Five kinds of muscular movements are ascribed to the action of the Vyaana Vaayu, a deranged condition of which is generally attended with diseases which are not confined to any particular region, member, or organ of the body, but are found to affect the whole organism (such as, fever, etc.)

Pakvaadhaanaalayo paanah kaale karshati chaapyayam,
Sameeranah sakrunmootra sukra garbhaartavaanyadhaa.
S. N. 13.

THE APAANA VAAYU : The Vaayu known as the Apaana acts in the lower region of the intestines (Pakvaadhaana) Its functions consist in bearing down the foetus and the faeces and in evacuating the urine, semen and catamenial blood.

3 Functions of abnormal Vaayu

(Prakupitha Vaayoh karmaadikam)

Samkochah parvanaam stambho bhedosthnaam parvanaa mapi—Loma harshah pralaapascha paani prustha sirograhah ||

Contraction and stupefaction of the digits (of the fingers), of pains in the bone-joints of the fingers, horripilation, delirium, pains in the arms, the back and the head.

Khanja paamgulya kubjatvam soshongaanaa manidrataa
Garbha sukra rajo naasah spandanam gaatra suptataa ||

Lameness, incapacity for locomotion, crookedness of the body, waste or emaciation of the limbs, insommia (or loss of sleep), loss of foetus, or the power of conception, that of secreting (disappearance of ?) vital seed and menses, throbbing or quivering of the body, loss of the sense of touch (as regards the entire body.)

Siro naasaakshi jatroonaam greevayaaschaapi hundanam,
Bheda stodaarti raakshepah mohaschaayasa evacha—
Evem vidhaani roopaani karoti kupitonilah—C. C. 28/20, 21, 22, 23. Edited by Vavilla.

*Hundana i. e. drawing in or to one side or crookedness of the head, the nose, the eyes the shoulders and the throat; cutting, piercing, and other kinds of pain (in the the teeth and upper lip etc), spasms and convulsions, swoons, sense of fatigue without labour —These are the symptoms caused by the provoked Vaayu.

Sramsa Vyaasa Vyadha Swaapa, Saada ruktoda Chedanam
Sangaangabhanga Sankocha, Varta harshana tarshanam ||
Kampa paarushya soushirya sosha spandana veshtanam ||
Stambhah kashaaya rasataa Varnah syaavo arunopivaa
Karmaani vaayoh

A. H. S. 12/46-47.

Falling out or looseness, extension or enlargement pain as if beaten with sticks, want of sense, cheerlessness, constant pain, piercing pain as if pricked with needles, tearing pain, retention or difficulty of elimination, want of function of limbs or dislocation, contraction, hardening of the faeces etc., joy, thirst tremours, hardness, hallowness, wasting, vibration., pain as if the limb is tied round with cords, numbness, astringent taste in the mouth, tawny, or red colour are the actions of abnormal vaayu.

*Hundana is a difficult word of even doubtful etymology. Gangadhara explains it as having different meanings in different connections. 'Sirohundana' means the bursting of, or the cracks in the sclap on which the hair grow. 'Naasaahundana' means the loss of the sense of the smell. 'Akshihundana' means piercing pains in the eyes. 'Jatruhundana' means pressure on or obstruction of the chest. 'Greevahundana' is wry neck.

Sramsa bhramsa vyaasa bheda saada harsha tarsha kampa varta chaala toada vyadhaa chestaa dhyaah, Tadhaa, khara parusha visada sushira arunavarna kashaaya virasa-mukha soasha soola supti Sankuchana stambhana khanjataa deeni vaayoh karmaani, C. S. 20/16. Telugu print Vavilla Press, Madras.

Falling out, displacement, extension or enlargement, bursting of limbs, cheerlessness, joy, thirst tremours, pain in the whole body, twitching, piercing pains (as if caused by needles), inflammations, painful sensation as if caused by the limb (that is its seat) being tightly bound with cords, and fractures; also roughness of the skin, hardness of the limbs, heaviness of the limbs, and absence of activity, perforations in the limbs, redness of complexion, astringent taste in the mouth, tastelessness in the mouth, severe pains of a local character, swellings, sleep, contractions (of skin, muscles, nerves &c., (and numbness or paralysis of limbs.)

4 Symptoms of Vaayu covered by Pitta, Kapha etc.

(Aavruta Vaayorlakshanam)

Karmowjoa bala varnaanaam naasoa mrutyu radhaa pi vaa—udaane naavrute praane ||,C. C. 28/207,

When 'praana' is obstructed by 'Udaana', the symptoms are the loss of all exertions, of 'Ojas' of strength, and of complexion. Even death may result.

Oordhvage naavrute apaane, chhardi swaasaadayo gadaah—Syurvaate C. C. 28/208

When the 'apaana vaayu' is obstructed by that vaayu which has an upward course (i. e. Praana), the symptoms that manifest themselves are vomitting, asthma, and other ailments of the kind.

Mohoalpoagni rateesaarah, oordhvage apaana samvrute-vaate syaat || C. C. 28/209.

When the Vaayu having an upward course (i. e. 'praana') is obstructed by 'apaana', the symptoms that manifest themselves are loss of consciousness, mildness of digestive fire, and diarrhoea.

Vamyaa dhmaana mudaavarta, gulmaarti pari kartikaah,- Lingam vyaanaavrute apaane || C. C. 28/210.

Vomitting, flatulence of the stomach, 'Udaavarta' epistasis), 'Gulma' (the ailment called abdominal tumours) and cutting pains in the rectum are the symptoms that appear when 'apaana' is obstructed by 'Vyaana'.

Apaanenaavrute vyaane, bhavet vinmosra retasaam, Ati pravruttih || C. C. 28/211.

When Vyaana is obstructed by Apaana, the .symptoms are an excessive tendency towards discharge of wind stools, urine, and vital seed.

Moorchaa tandraa pralaapo angasaado—agnyoajo bala kshayah, Samaa nenaavrute vyaane || C. C. 28/212.

When 'Vyaana' is obstructed by 'Samaana', the symptoms are swoons, drowsiness, delirium, langour of the limbs and loss of the digestive fire of 'ojas' and strength.

Stabdhataa alpaagneta swedah, cheshtaa haanih nimeelanam, Udaanenaavrute vyaane || C. C. 28/213.

When 'vyaana' is obstructed by 'udaana', the symptoms are stuperfaction of the body, weakness of the digestive fire, want of perspiration, loss of exertion, and closing of the eye-lids

Lingam Pittaa vrute daahah, trushtnaa soolam bhrama stamah (klamah)—Katwamla lavanoa shtnaischa, vidaaha sseeta kaamitaa || C. C. 28/61.

If the Vaayu be obstructed or invested by the pitta, the symptoms that manifest themselves are burning all over the body, thirst, 'soola' pains, vertigo and fatigue. Food and drink that are acrid in taste, or sour, or salin, or hot, brings in a burning sensation (in the chest?) as also a desire for cool things.

Saitya gourava soolani, katvaa dyupasayoadikam—Lamghana ayaasa rookshoa ushnakaamitaa cha kaphaavrute—C. C. 28/62.

If the vaayu be obstructed or invested by phlegm, the symptoms that manifest themselves are a sensation of cold, a sensation of heaviness of the limbs and 'soola' pains. Such food and drink as are acrid in taste and sour and saline give relief, also a desire for fast, for exertion and for things that are dry (unoily) and hot manifests itself.

Raktaa vrute sadaahaartih tvangmaamsaantaraje bhrusam. Bhave scha raagah swayadhuh, jaayante mandalaani cha—C. C. 28/63.

If the vaayu be obstructed or invested by blood, the symptoms manifested are a burning sensation, accompanied by pains or other kinds between the skin and the flesh. Swellings appear on the body that are of a red complexion. Circular eruptions also appear on the body.

Katih naascha vivarnaascha, pidakaa swayadhustathaa Harshah pipeelikaanaancha samchaara iva maamsage—C. C. 28/64.

If the (provoked) vaayu be obstructed or invested by the flesh, the symptoms are pimples, that are hard and discoloured. Swellings also appear on the different districts of the body. Harripilation or a sensation of 'harsha' is also like to what happens when ants creep over the body.

Chala ssnigdhoa mrudu sseetah, Sophoa ngeshwaruchi stadhaa, Aadhyavaata iti gyneyah, Sa kruchro medasaa vrutah—C. C. 28/65.

When the vaayu is obstructed or invested by the adepts, the symptoms are the manifestation of swellings on different limbs of the body that shift about and are glistening (oil) shoft and cold to the touch. There is also a dislike for food. This disease is named 'Adhyavaata'. It is very difficult to cure.

Sparsa masthnaa vrute tooshnam peedanam chaabhi nandati, Sambhajyate seedaticha soocheebhi riva tudyate—C. C. 28/66.

When the (provoked) vaayu is obstructed or invested by the bones, the symptoms are: The person desires the touch of hot things, and welcomes presure on his body. His body seems to break. He feels languid. Pains also appear as if he is being pierced with the needles.

Majjaa vrute vinaama ssyaat (vinamati) jrumbhanam, parivestanam, Soola ntu peedya maane cha paanibhyaam labhate sukham—C, C. 28/67.

When the (provoked) vaayu is obstructed or invested by the marrow, the symptoms that manifest themselves are: The person's body becomes bent, he yawns frequently; he thinks as if his body is being covered up.

Sukraa vegoa ti vegoavaa nishphalatwam cha sukrage, Bhukte kukshowcha ruk jeerne, saamya tyannaavrute anile—C. C. 28/68.

He is afflicted with colic or 'soola' pains also, and feels comfortable when his body is pressed with the hand.

When the (provoked) vaayu is located in the vital seed, the symptoms that manifest themselves are: absence of any thrill, or greatly increased thrill, in the emission of semen as well as the barrenness of the vital seed (semen).

When the (provoked) vaayu is obstructed or invested by the food that one has taken, pain sets in the stomach. And when that food is digested, the pain disappears.

Mootra apravrutti raadhmaanam vastow mootraa vrute-anile-Varchaso ativibandho adhah swasthaane parikruntati—C. C. 28/69.

When the (provoked) vaayu is obstructed or invested by the urine, (in the bladder) desire for urination is lost or the difficulty of micturition manifests itself. And flatulence, (with borborygmi), manifests itself in the abdomen.

Vrajatyaasu jaraam snehah bhukte chaa nahyate narah-Chiraat peedita mannena dukham sushkam sakrut srijet—C. C. 28/70.

When the (provoked) vaayu is obstructed or invested by the stools, obstruction takes place of the stools, urine and vaayu in the lower intestines, and the obstructed stools cause cutting pains remaining in its own place.

Sroanee vamkshana prusteshu rugwiloamascha maarutah, Aswastham hridayam chaiva varchasaa twaa vrute anile—C. C. 28/71.

Oily or fatty substance drunk (at such a time) are soon digested. If the person takes other kinds of food (at such a time), epistasis increase in consequence thereof. When there is (excess of) pressure (on the stomach) and intestines in consequence of the food

newly taken, are though any body else exerting pressure on the belly for a long time dry stools are passed with great difficulty, after a long interval.

Pain is felt in the hips, the groins, and the back, and the vaayu takes a reverse (upward) course, Verily, in consequence of the obstruction of the (provoked) vaayu by the stools, great uneasiness is felt in the region of the heart (through pressure on diaphragm).

5 Functions of Vaayu according to different locations (Sthaana bhedena vaayoar lakshanam)

Tatra kostaasrite duste nigrahoa mootra varchasoah, Bradhna hrdroaga gulmaarsah, paarswa soolam cha maarute—C. C. 28/24.

If the vaayu located in the (**koshtha**) (the large cavity of abdomen and thorax) be vitiated. the suppression of the urine and the stools takes place. It produces other ailments, as babo, heart-disease, abdominal tumours, piles, and pains in the sides.

Sarvanga kupite vaate gaatra sphurana bhanjane vedanaabhih pareetascha sphutamteevaasya sandhyayah—C. C. 28/25.

If the wind be provoked throughout the whole of the body, the result is throbbing of the body and a sensation of pain all over the body. The joints of the person afflicted seem to be bursting.

Grahoa vinmootra vaataanaam soolaadhmaanaasma sarka raah, Jangoaru trika paat prustah roaga soashow gua sthite—C. C. 28/26.

If the wind located in the rectum be provoked, the result is retention of stools and urine and the down-ward wind, as also colic pain, flatulence of the stomach, calculi, gravels, swellings, sugar in urine

diseases of the legs, the thighs, the sacrum, lower part of the spine, the feet, and the back.

Hrunnaabhipaarswodara ruk trushnodgaara visoochikaah —Kaasah kantahasysoashascha swaasaschaamasaya sthite— C. C. 28/27.

If that located in the 'Aamasaya' (stomach) be provoked, then it generates pains in the heart, the flanks, the abdomen, and the navel, thirst, eructations, and Visuchikaa (Cholera), also cough, dryness of the mouth and the throat, and asthama,

Pakwaasayastho antrakoojam soolaatopow karoticha kruchra mootra pureeshatwam aannaaham trika vedanaam— C. C. 28/28.

If that located in the 'pakvasaya' (small intestine) be provoked, it generates rumbling noice in the intestines, colic pains in the stomach accompanied by borboringmy, difficulty of micturition, constipation, epistasis, and pains at the end of the spine (the sacrum),

Srotraadishwindriya vadham kuryaa ddushta sameeranah.

The organs of sense, such as the ear, etc., also are destroyed by the provoked Vaayu.

Twagrookshaa sphutitha suptaa krusaa krishnaa chatudyate—C. C. 28/29.

Aatanyate saraagaacha parva ruk twak sthite nile— C. C. 28/30.

If that located in the skin, be provoked the skin becomes dry, cracked, insensible to touch, withered, and dark. Pain is felt in the skin which becomes slack and of a red complexion. The bone-joints also becomes afflicted with pain.

Rujasteevraah sa santaapaah vaivarnyam krutsnataa ruchih —Gaatre vaa roomshi bhuktasya sthambhaschaa sruggate anile. C. C. 28/31.

If the vaayu located in the blood, be provoked severe pains with excessive heat; and change of complexion, emaciation, dislike for food, tinda, favosa, and stuperfaction of the body of one when he has taken his meal (or according to some, incapacity, to digest the food taken,which lies within the stomach as a stupified inert mass manifest themselves.

Gurvangam tudyate atyardham danda musti hatam tathaa (yadhaa) Saruk ssramita (stimita) matyardham, maamsa medoa gate nile. C. C- 28/32.

If the Vaayu located in the flesh and adeps is provoked, the limbs become, heavy, and severe pains are felt in them as if the patient's body is being belaboured with a heavy club or clenched fist (of a strong man), sense of excessive exhaustion with only little labour.

Bhedoasthi parwanaam sandhi soolam maamsa bala kshayah—Aswapnah santataa ruk cha majja asthi kupite nile. C. C. 28/33.

If the Vaayu located in the marrow and bones, be provoked, one feels as if one's bone-joints, and joints in the digits are breaking. Piercing pains also are felt in the joints of the body. An attention or loss of both flesh and strength also takes place. Sleeplessness and constant pains (uneasiness) in all parts of the body are other results,

Kshipram munchati Badhnaati Sukram garbha madhaapi cha—Vikrutim janaye chaapi kupito anilah. C. C. 28/34.

If the vaayu located in semen be provoked, the result is the speedy emission or obstruction of the vital seed as also of the foetus in the womb. Or it may bring about defects of the vital seed in the foetus.

Baahyaabhyantara maayamam, khallim kubjatwa mevacha sarvaangai kaanga rogaamscha kuryaat snaayu gato anilah—Sareeram manda ruk sopham sushyati spandate. C, C. 28/35.

If the vaayu located in the tendons or ligaments be provoked, it generates diseases affecting only a part or the whole of the body. Swellings appear in the body, accompanied by mild pains. The body throbs here and there and dries up.

If the Vaayu located in the Siras be provoked, there are Ayamas (that is increase or decrease of external or internal length of the body i. e. tetanus of the two kinds), Khalli (wringing spasms and cramps) and crookedness of the body.

Tadhaa—Saptaa Stanvyo mahatyovaa Siraah vaate seraagate. C. C. 28/36.

The Siras lose all power of conducting impulses or sensation. They may also become thin or swollen.

Vaata poorna dhruti sparsha sodha ssandhi gate anile, Prasaara-naakunchanayoh pravrutti scha (apravruttih) ssa vedanaa. C. C. 28/37.

If the Vaayu located in the joints, be provoked, swellings appear on the body, whose touch resembles that of a leathern bag filled with air. A tendency also appears against extending or contracting the joints. Presence of pain is also felt.

Ata oordwam pravakshyaami naanaa sthaanaanta raasritah, Bahusah kupito vaayuh vikaaraan kurute hi yaau. S. N. 1/13.

Now we shall describe the nature of diseases brought about by the localization of the variously aggravated vaayus in the different parts of the body.

Vaayu raamaasaye krudhah chardyaadeen kurute gadaan, Moham moorchaam pipaasaamcha hrud graham paarswa vedanaam. S. N. 1/14.

In the cavity of the stomach (Aamaasaya) the deranged or aggravated vaayu gives rise to vomitting, vertigo, epileptic fits, thirst and pain at the sides (paarsva soola) and about the region of heart (Hridgata).

Pakwaasaya stho antrakoojam soolam naabhow karoti cha, Kruchra mootra purushatwam aanaaham trika Vedanaam. S. N. 1/15.

In the intestine (pakvaasaya) the enraged or disturbed vaayu gives rise to a rumbling in the intestines a piercing pain about the region of the umbilicus, scanty and painful urination and stools, or their entire suppression (Aanaaha), and pain about the region of the coccyx (Trika).

Srotraadishwindriya vadham, krudha ssameeranah. S. N. 1/16.

Similarly, incarcerated in the sense-organs, such as the ears, etc. it tends to deprive them of their respective faculties.

Vyvarnyam sphuranam rowkshyam suptim chumu chumaayanam, Twak stho nisthodanam kuryaat twag bhedam pari potanam. S. N. 1/17.

In the skin (lymph chyle) it produces a discolouring of the complexion, parchedness and twitching in the skin which spontaneously bursts, or becomes marked with cracks and fissures.

Vranaamoha raktago grandheen sasoolaam maamsa samsritah, Tadhaa bhedah sritah kuryaat grandheen mauda rujo uranaan, Kuryaat siraagata ssoolam siraakunchana pooranam. S. N. 1/18.

Similarly, the aggravated vaayu interfering with the principle of fat it brings on almost painless tumours (Granthi) unattended with any kind of ulcer. Incarcerated in the veins &c. (Siraa) it produces a stiffening or painful contraction, or a varicose or neuralgic condition,

Snaayu praaptah stambha kampow soola maakshepanam tadhaa. S. N. 1/19.

In a ligament (Snaayu), it produces numbness (anaesthesia), palsy, aching pain and convulsive jerks,

Hanti sandhi gata ssandheen soolasophow karoti cha. S. N. 1/20.

In a long joint, it tends to deprive it of its contractibility and produces a painful inflammatory swelling (about the affected part.)

Asthi sosham cha bhedam cha kuryaat soolam cha tat sthitah. S. N. 1/21.

In the bones it produces a wasting (atrophy) of the bones which crack and begin to spoutaneously burst, attended with the characteristic bone-ache.

Tadhaa majjagate ruk cha na kadaa chit prasaamyati. S. N. 1/22.

Again in that important principle of life, the marrow, it tends to dry it up and produces a sort of pain, extending all over the body which knows no respite or abatement.

Apravruttih pravruthirwaa vikrutih sukrage anile. S. N. 1/23.

Similarly, in the principle of semen it tends to produce a scanty, defective, or excessive emission of that vital fluid, or a complete stoppage thereof.

6 Eighty kinds of Vaayu affections ¶
(Aseetih vaata vikaarah)

1 Nakha bheda scha

Nakhabheda is otherwise called Kunakha. It implies a diseased nail. Psoriasis of nails.

2 Vipaadikaa cha

Vipaadikaa implies sores or blisters in the hands and feet. A kibe or ulcerated chilblain.

3 Paadasoolam cha

Paadasoola is a sharp pain in the feet.

4 Paadabhramsa scha

Paadabhramsa is a distortion of the feet from their natural shape.

5 Suptapaadataa cha

Suptapaada implies benumbed or paralysed feet.

6 Vaatakhuddaakaa cha

Vaatakhuddakaa is another name for Andhaka as Chakrapaanidatta explains. Kaviraaja Gangaadhara says that it is otherwise called Chaaluka. It is probably a kind of pain that moves over the feet.

7 ☾ Gulphagraha scha

Gulphagraha is pain in the ankle.

8 Pindikodvestanam cha

Pindikodveshtana is twitching of the calves of the legs.

¶ The definitions of these terms have been mostly adopted from Kaviraj Avinash Chandra Kaviratna's English Translation of Charaka Samhita.

☾ Gulpha grandhi scha—Paathaantaram

9 Gridhrasee cha

Gridhrasee is Sciatica.

10 Jaanubheda scha

Jaanubheda is pain as in a Fracture of the knee.

11 Jaanuvislesha scha

Jaanuvislesha is Dislocation of the knee.

12 Oorusthambha scha

Urustambha is Reheumatism or paralysis of the thigh.

13 Oorusaada scha

Urusaada is weakness of the thigh.

14 Paangulyam cha

Paangulya is total lameness occasioned by malformation of the legs or owing to the legs being undeveloped.

15 Gudabhramsa scha

Gudabhramsa is Prolapsus ani.

16 Gudaarti scha

Gudaarti is Ulceration with pain in the anus.

17 Vrushanotkshepa scha

Vrishanotkshepa is a pulling in of testes from their fleshy case.

18 Sephasthambha scha

Sephasthambha is the turgidity of penis.

19 Vankshanaanaaha scha

Vankshanaanaaha is a gripping pain in the groins or the pubic or illiac regions.

20 † Sonitabheda scha

Sonitabheda implies Hemorrhages of every kind

21 Vidbheda scha

Vidbheda is a particular kind of diarrhoea that is regarded as induced by disorders of vaayu.

22 Udaavarta scha

Udaavarta is a general name for abdominal diseases characterised by pain and upward movement induced by vitiation of vaayu.

23 Khanjatwam cha

Khanjatwa is lameness of foot.

24 Kubjatwam cha

Kubjatwa is hump-back.

25 Vaamanatwam cha

Vaamanatwa is dwarfness.

26 Trikagraha scha

Trikagraha is inflammation or pain in the lower part of the spine.

27 Prusthagraha scha

Prishthagraha is inflammation or pain in the back

28 Paarsvaavamarda scha

Paarsvaavamarda is pain on the sides or flanks.

29 Udaraaveshta scha

Udaraaveshta is a pain in the abdomen causing the sensation of the abdomen being pressed by a heavy substance wrapped all around it on the out side.

30 Unmaadaa scha

Unmaada is Lunacy.

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† Sronibheda scha.—Paathaantaram

31 Hrudrava scha

Hrudrava is Palpitation of heart.

32 Vakshodharsha scha

Vakshodharsha is, probably, a sensation of the chest being pressed from within.

33 Vakshauparoddha scha

Vaksha-uparodha is pain in the chest, inducing a sensation of heavy pressure on it from outside.

34 Vakshastoda scha

Vakshastoda is pain in the chest, inducing a sensation of needles or sharp-pointed stakes piercing against it.

35 Baahusosha scha

Baahusosha is emaciation of the arms.

36 Greevaastambha scha

Greevaastambha is stiffness of the neck

37 Manyaastambha scha

Manyaastambha is wry neck.

38 Kanthoddhvamsa scha

Kanthodhwamsa is hoarseness or suppression of the voice.

39 Hanubheda scha

Hanubheda is dislocation of the cheek-bones.

40 Oshtahbheda scha

Oshthabheda is a rupture of the lips.

41 Dantabheda scha

Dantabheda is falling off or breaking of the teeth.

42 Danta saidhilyam cha

Dantasaithilya is looseness of the teeth.

43 Mookatwam cha

Mookatwa is dumbness.

44 Vaaksanga scha

Vaaksanga is temporary dumbness, or difficulty of speech, (such as stammering), or unintelligibility of speech.

45 Kashaayaasyataa cha

Kashaayaasyataa is the presence of an astringent flavour or taste in the mouth.

46 Mukhasosha scha

Mukhasosha is dryness of the mouth.

47 Arasajnataa cha

Arasajnataa is loss of the sensation of flavour or taste.

48 ‡ Ghraana naasa scha

Ghraananaasa is loss of the sensation of smell,

49 Karnasoola scha

Karnasoola is Otalgia—pain in the ear.

50 Asabdasravanam cha

Asabadasravana is that form of deafness in which the person can hear words uttered very softly or in whispers only or where there is no sound at all.

51 Uchaisravanam cha

Uchaisravanam is that form of deafness in which the person hears only such words as are uttered very loudly.

52 Vartmastambhas cha

Vartmastambha is paralysis of the eyelids.

53 Vartmasankocha scha

Vartmasankocha is contraction of the eyelids.

‡ Agandhagnata—Paathaantaram

54 Timiram cha

Timira is Gutta serena or Cataract, causing incomplete or complete loss of sight.

55 Akshisoola scha

Akshisoola is inflammation with sharp pain in the eye.

56 Akshivyudaasa scha

Akshivyudaasa is inversion of the eyeball or balls.

57 Bhroovyudaasa scha

Bhruvyudaasa is a falling down of the eyebrows.

58 Sankhabheda scha

Sankhabheda is pain in the temporal bone or its depression or fracture.

59 Lalaatabheda scha

Lalaatabheda is pain in the frontal bone, or its depression or fracture.

60 Siroruk cha

Siroruk is Headache.

61 Kesabhoomi sphutanam cha

61 Kesabhumi sphutana implies sores and cracks in that part of the head which is covered with hair.

62 Arditamcha

Ardita is Facial paralysis.

63 Ekaangaroga scha

Ekaangaroga is partial or local paralysis or defect.

64 Sarvaanga roga scha

Sarvaangaroga is complete paralysis.

65 Pakshavadha scha

Pakshavadha is Hemiplegia.

66 Aakshepa scha

Aakshepaka means convulsions both epileptic and hysterical.

67 Dandaka scha

Dandaka is such a stiffness of the whole body that the patient resembles a stake of wood.

68 Srama scha

Srama is such weakness or exhaustion of the system that one feels completely worn out after even slight exertion.

69 Bhrama scha

Bhrama is swimming of the head with a sensation or rotatory motion of the whole body. Chakrapaanidatta thinks it refers to loss of memory.

70 Vepathu scha

Vepathu is Paralysis Agitans.

71 Jrumbhaa cha

Jrimbhaa is constant yawning.

72 Hikkaa cha

Hikkaa is Hiccup.

73 Vishaada scha

Vishaada is cheerlessness of mind.

74 Atipralaapa scha

Atipralaapa is violent Delirium'

75 Glaani scha

Glaani is Melancholia.

76 Raukshmyam cha

Raukshmya is general dryness caused by the absence of fatty matter.

77 Paarushyam cha

Paarushya is a general hardness or roughness of the limbs.

78 Syaavaarunaayabhaasataa cha

Syaavaarunaavabhaasataa is a paleness and redness of the complexion.

79 Aswapna scha

Asapna is Insomnia or sleeplessness.

80 Anavasthitatwamcha

Anavasthitachittatwa is restlessness of mind.

Iti aseetir vaata vikaaraa. Vaata vikaaraanaam apari sankhyeyaanaam aavishkruta tamaah vyaakhyaataah

These are the Eighty disorders due to vaayu. Among the innumerable diseases caused by the vitiation of vaayu, only those have been mentioned that are generally noticed.

A perusal of the above passages shows that the functions and symptoms attributed to *Vaayu* alone are already too numerous. It shows that *Vaayu* alone is responsible for the most important functions of the body and at least 313 individual symptoms

It is striking that a scrutiny of these functions and individual symptoms at once reveals that all of them are the evidence of functions of the nervous system of our body. This will be more apparent when they are arranged under different headings including the different functions of the nervous systems.

The Nervous System

The different functions of the nervous system may be classified under the following heads and one and all of the above quoted functions and symptoms can be very appropriately arranged under each group as will appear in the table detailed hereafter

The nervous system consists of 2 main divisions :—
1. Cerebrospinal, including brain, spinal cord, cranial and spinal nerves; 2. Autonomic, an Independent system. Of these two systems the cerebrospinal system regulates the mental functions, functions of the special senses, all locomotions and all sensations of the body which will all disappear as soon as the cerebrospinal system is paralysed; while the functions maintained by the autonomic nervous system, *e. g.*, the circulation, respiration, process of child birth, swallowing, digestion assimilation, fertilization, being autonomic will go on automatically when the cerebrospinal system is paralysed.

These two systems, the cerebrospinal and the autonomic very often coordinate and although the autonomic nervous system is termed autonomic and is thus dependant on no other nervous system, still it acts in coordination with the peripheral nerves originated from the cerebrospinal system, *e.g.* in defecation, micturition, parturition etc. This is shown in figure 1. In the figure it will be noted that the spinal nerves are very stout and thick while the fibres of the autonomic system are very thin and fine. This can be explained by using a simile if the spinal nerves are compared with the telephone system and the autonomic nervous system as the electric street supply.

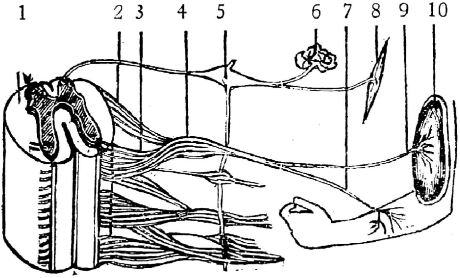

FIG. 1. Showing the relation of nerves and autonomic nervous system.

1. Spinal cord, 2. Anterior nerve roots, (motor), 3. Posterior nerve roots (Sensory), 4. Spinal ganglion, 5. Chain of Autonomic nervous system (*Pingala* in the right side), 6. Secretory gland, 7. Sensory nerve, 8. Involuntary muscle. 9. Motor nerve, 10. Voluntary muscle.

In the telephone system there are always a pair of wires communicating the exchange and the distant telephone. Supposing there are 10,000 telephone connections there must be 20,000 wires running between the exchange and the telephone apparatus. This is the same as what is found with the spinal nerves. From every muscle and the skin surface a separate and distinct fibre runs to the spinal cord.

According to the number of such fibres the size of the nerve becomes thinner or thicker. Thus the sciatic nerve is about the thickness of the little finger. In the electric street supply, on the other hand, only 2 wires are required to run between the power house and the house connection, the thickness of the wire depending on the load it has got to carry. As in practice the load is relieved by having secondary power stations so that the actual individual house connection is maintained by thinner wires. The same thing takes place in the autonomic nervous system. The main lines do not require thick nerve fibres and the ganglia in the chain of the sympathetic system act as the secondary power houses in the simile. The sympathetic fibres, particularly those supplying the viscera and organs, are necessarily very fine in comparison to the spinal nerves.

The modern knowledge on the autonomic nervous system is mainly due to Langley who published his monograph in 1921. It is surprising that while the knowledge on this very important system, rather the most vital one, has been acquired only during the last 20-30 years, the originators of the *Tridosha* theory came to know of this system in a remarkably accurate way and that in minute details for more than 4000 years. In the words of Langley, "the progress of this system has been continuous for at least the last 250 years, though at times it has progressed but slowly." Still this period of 250 years comes to insignificance in comparison to the hoary antiquity of the origin of the *Tridosha* theory which, we shall presently see, mainly deals with the manifestations of this system. Even the *Tantric* school made a special study of this subject long before Langley's calculation of 250 years.

Autonomic Nervous System.

The autonomic nervous system is so-called, because of its independence in regulating very important functions of the body, *e. g.*, the movement of the heart, respiration, secretion etc., and all these, with very rare exceptions, are entirely outside the influence of will. This is differentiated from voluntary movements, which are produced by will. Involuntary movements are put into two categories. First, those, *e. g.*, movements of the respiratory muscles during sleep, which

could also be produced by will, and secondly those *e. g*, movements of the heart and intestines over which the will has no control, excluding, of course, the supernatural feats demonstrated by the *Yogis*. Ordinarily the functions of the cerebrospinal nervous system are evidenced by voluntary movement, appreciation of sensations, etc., but all the normal functions of the autonomic nervous system are carried on without any effort on the part of the individual and that, again, completely unconsciously. Some amount of visceral reactions, *e. g.*, thirst, hunger, need for visceral evacuation are felt normally and only in abnormal conditions, visceral reactions, *e. g.*, colic, cardiac pain, etc., are perceived. Although this part of the nervous system is beyond the influence of will, still it shows a great susceptiblity to emotional influences (*e. g.*, fear, rage, grief, joy and other mental excitement) as seen in cases of emotional blushing, sweating, tears, increased heart rate, change in blood pressure, etc.

Anatomy of the Autonomic Nervous System—Any one dissecting the human body is well familiar with two strings of nerves, one on each side of the spinal column, with swellings like knots appearing at intervals. The one on the right is called *Pingala* and that on the left *Ida*. These strings, start from the neck and extend up to the end of the spinal column. The knots in these strings, called ganglia, in the first place, are set more or less regularly in the form of one ganglion to each spinal nerve root, *i. e.*, corresponding to the nerve coming out by the side of each vertebra. Secondly in several places these ganglia appear to form bigger knots. Thus appear in the neck two ganglia named superior cervical ganglion and the inferior cervical ganglion united by the cervical sympathetic trunk. In the thorax, appears the "stellate" ganglion ; in the abdomen the semilunar ganglion, and the superior mesenteric and interior mesentric ganglia. In the pelvis, the pelvic ganglion is seen.

In addition to these groups of ganglia found in connetion with the spinal column, nerve fibres of the autonomic system also exist in the brain. These are found in the form of ciliary ganglion in the orbit influencing the action of the pupil of the

eyes, submaxillary ganglion influencing the secretion of saliva, and other fibres which run to the œsophagus, stomach and intestines as also the inhibitory fibres to the heart.

Functions of the Autonomic Nervous System—It is found that all the functions of the system can be grouped under two main headings: (1) the control of involuntary muscles of the more important organs of the body, particularly those of the heart and blood vessels, organs of respiration, lungs and bronchi, abdominal viscera, of the eye and of the skin (erection of hair, emotional blushing, etc); and (2) the control of all secretory glands of the body both having external or internal secretions Further, according to the peculiarity of function and distribution of the fibres the autonomic nervous system has been divided into two distinct systems—the sympathetic system and the parasympathetic system. These two systems show peculiar differences in their anatomical, physiological, and pharmacological reactions and are very often antagonistic to each other. These two systems send nerve fibres to the same organs but for opposite purposes, *e. g*, the sympathetic dilates the pupil and accelarates the heart while the parasympathetic contracts the pupil and slows the heart. It will be convenient to describe the functions of the two systems and their differences when put in a tabular form in which it will be noted that the combined effect of the sympathetic and parasympathetic reactions leads to the normal balance of the functions of the different organs.

Table showing the functions of Autonomic Nervous System including the difference and antagonism between the Sympathetic and Parasympathetic Systems.

SYMPATHETIC	PARASYMPATHETIC
***Anatomically*:**	
Extends along the 8th cervical to the 2nd lumbar segments of the spinal cord. The fibres arise from spinal cord and end into a ganglion of the sympathetic chain.	Fibres arise from mid-brain, medulla and the sacral region in the cord, ending in some of the outlying ganglion *e.g.*, the ciliary ganglion of the eye and the ganglia found in the plexuses round the heart, the pelvic organs etc.

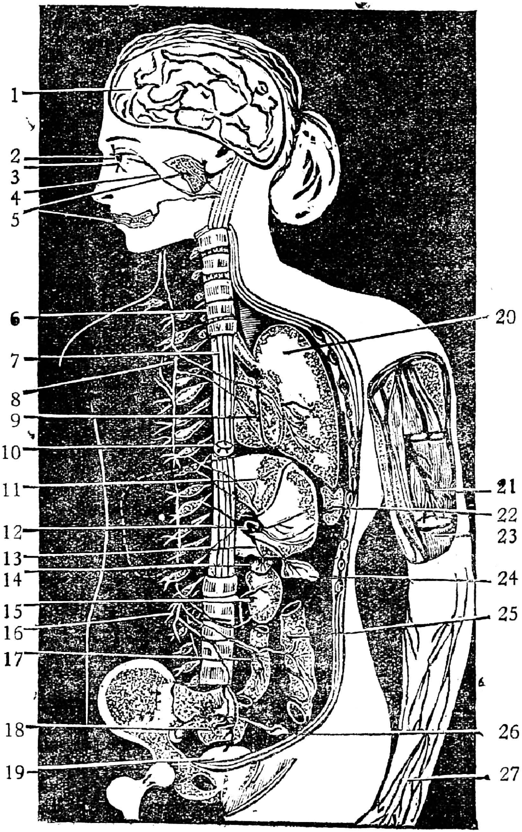

FIG. 2.

Showing the Anatomy of the Autonomic Nervous System.

1 Brain, 2 Pupil of the eye, 3 Lower eyelid, 4 Nerve fibres to pupil and lachrymal gland, 5 Salivary glands, 6 Spine, 7 Spinal cord, 8 Chain of right Autonomic Nervous System (**Pingala**), 9 Cardiac plexus, 10 Cut end of Spinal cord, 11 Liver, 12 Cœliac ganglion, 13 Fibres to pancreas, 14 Suprarenal, 15 Kidney, 16 Inferior mesenteric ganglion, 17 Small intestine, 18 Uterus, 19 Bladder, 20 Left lung, 21 Nerves to the muscles, 22 Spleen, 23 Muscle, 24 Pancreas, 25 Colon, 26 Ovary, 27 Sensory nerves.

Physiologically :

Mainly controlled by spinal cord.	Mainly controlled by the brain
Controls skin, erection of hair, (goose skin), skin glands (secretion of sweat), blood vessels of the trunk and limbs (vasoconstriction), pupil (dilatation), ciliary muscles, orbital muscles, lacrymal, mucous and salivary glands, sebaceous and sweat glands, accelaration of heart, thyroid gland, lungs, bronchi (dilatation), stomach and intestine, kidneys, pelvic viscera (contraction of sphincter of anus and vagina), liver glycogen converted into glucose; spleen discharges red blood cells.	Contraction of pupil, lachrymal glands, salivary glands, mucosa of the tongue; controls heart, stomach and intestines.

Pharmocologically :

Particularly sensitive to adrenalin.	Particularly sensitive to atropine.

(18)

The antagonism is shown thus:

Pupil—Dilates	Contracts
Heart—Accelerates	Slows
Arterioles—Contract	Inhibit vasoconstriction
Peristalsis—Inhibited	Stimulates intestinal movements
Bladder—Fills by contraction of sphincter and inhibition of detrusor.	Empties the bladder by inhibiting the sphincter and stimulating the detrusor.

The general physiology of the autonomic nervous system can thus be grouped under 4 main heads:—

(1) Movements of heart, lungs and intestines.
(2) Secretion of glands.
(3) Vasomotor impulses.
(4) Regulation of sphincters.

The relation of Vaayu to the Nervous System

After describing the whole range of the nervous system of the body the attention may now be directed to the study of **Vaayu** and its relation with the nervous system. This classification of the nervous system into (1) the Cerebrospinal system which regulates the mental functions, function of the special senses, all locomotions and all sensation of the body ; and (2) the Autonomic nervous system which regulates circulation, respiration, secretions, etc., may be put as the headings in the following table and attempt may be made to put the qualities and symptoms enumerated above in the passages quoted from the **Samhitas** under these heads. (See Pages 90, 91)

The table shows the classification of the 313 symptoms collected from the **Samhitaas** under 9 groups into which all the manifestations of the nervous system are divided in terms of modern physiology. The 9 groups with their sub-groups are indicated in the second column of the table. The groups numbered 1, 2, 4, 8 and 9 are those of the central nervous system and those numbered 3, 5, 6 and 7 belong to the autonomic nervous system. The table shows further, that this

GOVERNMENT

modern physiological classification agrees essentially with the classification of **Vaayu** under 5 forms. Thus groups 1, 2, and 3 indicate **Praana Vaayu**; group 4, **Udaana Vaayu**; group 5, **Samaana Vaayu**; group 6, **Apaana Vaayu** and groups 7, 8 and 9, **Vyaana Vaayu.** The sites of these 5 forms of **Vaayu** are indicated in column No. 3.

From this table it appears that of the 313 symptoms due to normal and abnormal **Vaayu**, **Vyaana Vaayu** represents 217 symptoms; **Praana Vaayu** 57 symptoms; **Apaana Vaayu** 23 symptoms; **Samaana Vaayu** 11 symptoms and **Udaana Vaayu** 5 symptoms, making a total 313.

The maximum number of symptoms are due to pain—78 symptoms; muscular action 49 symptoms, secretion of sweat glands 28, mental symptoms 26, paralysis and wasting of muscles 25, contraction and dilatation of vessels 19; cardiac action, respiration and deglutition 19; excretion 17; disordered sensation 14; due to spinal senses 11 and other forms 26.

Five Kinds of 'Vaayu'

This table shows that all the functions and 313 symptoms quoted above belong to one or other of the groups of the nervous system enumerated in the classification detailed above. This definitely proves the **Vaayu** is nothing but the manifestations of the nervous system and nervous system alone.

From the above descriptions, based on gross anatomical findings on every dead body, one is forced to note the parallelism of the functions which exist between the autonomic nervous system and that of **Praana**, **Samaana** & **Apaana Vaayus**, and that of the cerebrospinal system with **Praana** (mental function and special senses), **Vyaana** and **Udaana Vaayus.**

The parallelism as indicated above is now dealt with under each **Vaayu** separately.

Praana Vaayu

Praana Vaayu:—The functions of **Praana Vaayu** in normal condition are spitting, sneezing, belching, respiration, degluti-

tion **Stheevana kshavadhoo-dgaara, swaasaa haaraadi karmacha** to which Vaagbhata adds **Budheendriya hridaya mano dhamanee dhaarana** intelligence, the action of the heart, mind and vessels (A. H. S., 20) and **Vaayuryor vaktra sanchaaree sapraano naama deha druk, soannam pravesayatyanthah Praanaam schaa pyavalambate** (S. N. 1/7). Comparing these functions with those mentioned in the first three groups of the table one finds the close relationship existing between them. In fact, all of the functions attributed to **Praana Vaayu** are admirably the same when considered in the light detailed above. It can be remembered here that **Praana Vaayu** is responsible for the function of the heart itself and the big vessels originating from it and not the circulation through the arterioles and capillaries. The capillary circulation regulated by the vasomotor system throughout the whole body maintaining the circulation of blood and also the lymph carrying the **Rasa Dhaatu** to each cell is maintained by **Vyaana Vaayu** as shown in group 7 of the table. The organs of special senses, excluding those of the eye (vision) and skin (sensation) are the function of **Praana Vaayu**. The skin sensation is controlled by the **Vyaana Vaayu**, while that of vision is not mentioned; probably this is included under **Aalochaka Pitta**. As one **Buddheendriya** it is undoubtedly included under **Praana Vaayu** according to Vaagbhata.

Regarding the site of **Praana Vaayu**, it is, again, equally remarkable. Charaka mentions the site **Sthaanam praanaasya seershorah karna jihvaasya naasika** (C. C. 28/4) *i. e.*, the head, thorax, ears, tongue, mouth and the nose. Compairing this with the brain, special sense organs and the cervical gangloin of the autonomic nervous system having their seat in the head, neck and thorax is shown in the first 3 groups of the table, a complete agreement between them is found. The first 3 groups include mental functions, special sense organs and those regulated by superior and inferior cervical ganglia of the sympathetic. It is to be particularly noted that while brain is not specifically mentioned as the seat of **Vaayu**, the head has repeatedly been mentioned. Further, **Shira** is undoubtedly used synonymously as brain when we consider the definitoin of **Shira** by Charaka. Charaka mentions that the

site of the life of living beings, the site of 5 **Jnaanendriyas** and that which is the best part of the body. is known as **Shira.**

Praanaah praanabhrutaam yatra sthitaah sarvendriyaani cha, Yaduttamaanga mangaanam sirah tadabhidheeyate ||

C. S. 17/5.

As already mentioned, the function of **Praana Vaayu** as the agent for vision is not mentioned probably this being included under **Aalochaka Pitta**. According to my conception of **Praana Vaayu** as detailed above a complete agreement could have been reached with Aayurvedic literature had the reading of Charaka been **Sthaanam .praanasya seershorah kantah jihvaakshi naasikaah**, including thereby the eyes under this group. Some authorities have actually quoted the passages mentioning **Jihvaakshi naasikaah.**

Samaana Vaayu

The function and site of **Samaana Vaayu** have been mentioned by Charaka (C. C. 28/4) — **Sweda doshaambu vaaheeni srotaamsi samadhistitah, Antaragnescha paarswasthah samaanogni balapradah.** **Samaana Vaayu**, the giver of energy, seated by the side of the digestive fire regulates the channels which carry the waste materials, the **Doshas** and the fluids, and Susruta (S. N. 1/9)—**Samaana Vaayu** attached to the digestive fire and flowing through the stomach and intestines digests food, separates the products of digestion, one from the other and moves the waste products.

Aama pakwaasaya charah samaano vahni sangatah,
So annam pachati tajjaamscha viseshaan vivinaktihi. (S N. I-II.)

The solar plexus, semilunar and superior mesenteric ganglia detailed in the group 5 of the table, representing **Samaana Vaayu** show exactly all the above functions and also that of the site. The chief function of **Samaana Vaayu** are digestion due to vascular and secretory activity of the stomach and small intestines. Ileocaecal sphincter, kidneys and spleen are also controlled by **Samaana Vaayu** thus performing. **Bhuktam gruhnaati pachati vivechayati munchati.**

Table Showing the Classification of 313 Symptoms collected from the 'Samhitas' under Nine Groups with Sub-groups

	Site	Five kinds of **Vaayu** C. C. 28/4	**Vaayu** affections according to site S. N. 1/21-23	One **Vaayu** covered by another C. C. 28/67, 68	Symptoms of abnormal **Vaayu** C. S. 20/10	Abnormal **Vaayu** A. H. S. 21/46-47	Abnormal **Vaayu** C. C. 28/8	Abnormal **Vaayu** according to site C.C. 8/22-34	80 symptoms of abnormal **Vaayu** C. S. 20/9	No. of symptoms	Total symptoms under each of 9 groups	Total symptoms under each kind of **Vaayu**
PRAANA VAAYU												
Group 1.												
Mental defects	Brain	1	2	5	...	...	1	...	4	13		
Nervousness and vertigo	Brain	...	...	2	...	1	2	2	2	9		
Disordered sleep	Brain	...	...	1	...	...	1	1	1	4		
Group 2.											26	
Organ of sight	Brain	...	...	...	...	...	...	...	...	0		
Organ of hearing	Brain	...	1	1	...	...	...	1	3	6		
Organ of smell	Brain	...	...	...	...	...	...	...	2	2		
Organ of taste	Brain	...	...	...	1	1	...	...	2	4		
Group 3.											12	
Cardiac action	Superior & inferior cervical ganglion	...	1	1	...	...	...	1	2	5		
Respiration	Superior & inferior cervical ganglion	1	...	3	...	...	...	2	...	6		
Deglutition	Superior & inferior cervical ganglion	4	...	2	...	...	...	1	1	8		
UDAANA VAAYU											19	57
Group 4.												
Speech	Chest and throat	1	...	2	...	...	...	...	2	5	5	5

SAMAANA VAAYU												
Group 5.												
Digestion	Solar plexus, semilunar & superior mesenteric ganglia	...	...	3	...	...	...	2	...	5		
Other digestive disturbances		...	...	2	...	...	...	4	...	6	11	11
APAANA VAAYU												
Group 6.												
Excretion	Inferior mesenteric ganglion	1	2	4	...	2	...	6		17		
Function of bladder, uterus & genital organs		1	2	...	...	...	1	2	...	6	23	23
VYAANA VAAYU												
Group 7.												
Contraction of vessels	Vasomotor & pilomotor nerves	...	1	...	...	2	1	3	...	7		
Blushing		1	4	...	1	2	...	3	1	12		
Erection of hair		...	...	1	1	1	1	...	...	4		
Secretion of sweat glands		...	3	3	7	2	...	6	7	28	51	
Group 8.												
Pain	Sensory nerves	...	13	4	4	6	6	22	23	78		
Disordered sensation		...	2	2	1	2	1	2	4	14	92	
Group 9.												
Muscular action	Motor nerves	6	3	2	7	3	5	8	15	48		
Paralysis		...	1	3	1	1	1	2	8	17		
Wasting of muscles		...	1	...	...	1	1	4	1	8	74	217
		16	36	41	23	24	21	72	80	313	313	313

Apaana Vaayu

The function and site of **Apaana Vaayu** are detailed as follows :—

> **Vrushanow vasti medhram cha naabhyooroo vankshanow gudam**
>
> **Apaana sthaana mantrasthah sukra mootra sakrunti cha**
> **Srujatyaartava garbhow cha yuktaah sthaana sihitaaschate**
> **Swakarma kurvate deho dhaaryate tai ranaa mayah.**
>
> C. C. 28/4.

The seats of **Apaana vaayu** are the testicles, penis, bladder, umbilicus, thighs, hips and the rectum whence it performs the function of excretion of semen, urine, feces, menstrual blood and fetus.

Further—

> **Pakvaadhaanaalayo apaanah kaale karshati chaa pyayam,**
> **Sameeranh sakrunmootra sukra garbhaarta vaan yadhah.**
>
> **S. N. I-13.**

Being seated in the rectum, **Apaana vaayu**, brings down in proper time, the wind, feces, urine, semen, fetus and menstrual blood.

One finds a complete corroboration of the functions and site of the inferior mesenteric ganglion mentioned in group 6 of the table with those mentioned by Charaka and Susruta quoted above. The excretory functions of **Apaana vaayu** are performed by motor and inhibitory fibres to bladder, rectum, uterus and vagina. Although the sphincters are controlled by the autonomic nervous system, the acts of micturition defecation aud parturition require a great coordination of voluntary action of **Vyaana vaayu**—in the form of contractions of the abdominal and other muscles which constitutes the bearing down pressure.

Vyaana Vaayu

The functions and site of **Vyaana vaayu** are :—

> **Deham vyaapnoti sarvamtu vyaanah seeghragatir nrunaam,**
> **Gati prasaarana akshepa nimeshaadi kriya ssadaa.**
>
> C. C. 28/3.

Krutsna deha charo vyaano rasa samvahanodyaatah,
Sweda sruk sraavanaschaapi panchadhaa cheshtayatyapi.
(S. N. 1/10.)

These include mainly—movements, flexion, extension, closing and opening of the eyelids, regulation of the flow of sweat and blood, and circulation of blood, lymph and chyle throughout the body. The functions detailed under the groups 7, 8 and 9 *i. e.*, all motor, sensory and vasomotor fibres of the whole body indicate all the items quoted above. Moreover, along with normal movements, any disturbance or loss of movement *e.g.*, paralysis, incoordination, disordered gait, muscular rigidity, tremor, muscular, atrophy will invariably follow when there is any disorder of **Vyaana Vaayu**. Susruta mentions the regulation of sweating as one of the functions. This includes, thereby, although not definitely mentioned, the erection of hair or blushing of the skin as these functions as well as sweating are the function of the pilomotor and vasomotor functions regulated by the autonomic system.

In the passages quoted above there is no mention of the mechanism of sensation regulated by **Vaayu** not to speak of the **Vyaana Vaayu**. This must be, included as function of **Vyaana Vyaayu** as shown in group 8 (sensory) of the above table. Although the mechanism of sensation as the function of **Vaayu** is nowhere mentioned, still it has undoubtedly been in mind when abnormality of **Vaayu** is considered. This comes to the prominence when we consider the table which shows that 92 symptoms out of 313 due to disturbance of sensation which alone constitutes 30% of all symptoms due to abnormal **Vaayu**. I have noted elsewhere that the most important indication of abnormal **Vaayu**, rather to indicate in one word the derangement of **Vaayu** is characteristically **Soola** (Pain) which is not the effect of **Pitta** and **Kapha** while that of **Pitta** is **Daaha** (burning sensation) and of **Kapha Sodha (Oedema)**. This brings the function of **Vaayu** in regulating sensation to the forefront and hence it is adequately included in the table as the function of **Vyaana Vaayu**. Charaka, however, mentions that **Vaayu** has the prominent function

in giving life and sensation **Vaayuh praana samgynaa pradaanaam sreshtah** (C. S. 25.) **Vyaana Vaayu**,like **Praana Vaayu**,thus represents both the cerebrospinal and the autonomic nervous system. All locomotions and sensations, both normal and abnormal are controlled by the cerebrospinal system while capillary circulation. sweating and blushing (by vasomotor fibres) and erection of hair (by pilomotor fibres) are regulated by the autonomic nervous system.

Udaana Vaayu

Udaana Vaayu has got one particular function and that of speech including singing, and the sites adequately mentioned to be **Naabhi urah** and **Kantah-urah** (the lungs) and **Kantah** (particularly meaning the larynx). These are indicated by the following passages:

Udaanasya punah sthaanam naabyurah Kantah eva cha,
Vaak pravruttih prayatntorjo bala varnaadi Karma cha.
(C. C. 28/3.)

The seat of **Udaana Vaayu** is umbilicus, chest and throat. The functions are speech, efforts, strength etc.

Udaano naamo yastoordwa mupaiti pava nottamah,
Tena bhaashita geetadi, viseshobhipravartate. (S. N. 1/8.)

Udaana Vaayu seated high up regulates speech, signing etc.

There is thus a close agreement with the functions and site mentioned in Aayurveda to those mentioned in the group 4 of the table.

The function of the **Udaana Vaayu** which is a complex one may now be discussed in detail. For the purpose of speech several factors are called into play. (1) The lungs are called in to act as the bellow, rather the bag of the bagpipe so that expiration of either a uniform or varying character is maintained. This is often supplied by the contraction of other muscles of the thorax and the abdomen. (2) The larynx acts as the reed. This is done by the contraction or relaxation of the muscles of the two vocal cords, one on each side, so as to make the opening bigger or smaller. The more the

contraction of the vocal cords *i. e.*, the narrower the opening the higher the note produced as in singing. By difference in contraction of the different muscles of the larynx thereby changing the tension and length of the cords the pitch, loudness, quality and other characters of the voice are produced. Loudness mainly depends on the force of the blast of air from the chest passing through the larynx. (3) Cavities of the mouth, (particularly modification in its shape), nose, nasal sinuses, trachea etc. play the chief role in producing the qual ity or timbre of the voice. (4) Muscles of the tongue, lips, throat, and mouth come to produce the vowel and consonant sounds *i. e.*, the articulation of speech. The shape of oral cavity plays an important role. Function of speech requires coordination and synchronisation of the muscles for functioning the (1) lungs, (2) larynx. (3) mouth, pharynx and nose. Nearly all of them are innervated by the cerebrospinal nerves. Of these, those acting on the lungs are spinal in origin while those of the mouth and larynx are from the brain-vagus (10th), spinal accessary ((11th), hypoglossal (12th), and the lips by the facial (7th cranial) nerves. The trigeminal (5th) may also functionate in changing the size of the mouth. It is thus seen that the 7th, 10th, and 12th cranial nerves play the most important role in the mechanism of speech.

Functions of Normal Vaayu

This study of the normal functions of **Vaayu** forces immediately to the conclusion that all the diseases characterised by the disorders of the mind, intellect and nervous funtions are caused by derangement of **Vaayu** –(**Vaayu vikruti**). Further, as nerve fibres exist in every minute part of the body so there exists no part of the body free from **Vaayu**.

These nerves, after all, as the electric wires are, only the conducting material for the nerve impulses. **Vaayu** like electricity is manifested by its fuctions and cannot be seen. It is thus appropriately called **Avyakta (Adrusyamoorti) Vyakta karmaa cha**. The functions of **Vaayu** as enumerated above apparently manifest that **Vaayu** is possessing independant action -(**Swatantra**) self-acting, (**Nitya**) all pervading

(Sarvaaga), guiding principal of **Doshas (Doshaanam netaa)**, originator of disease **(Roga samooha raat)**, quick in action **(Aasu kaaree)**, always ready to act **(Muhuschaaree)**, capable of conjoint action **(Yoga vaahee)**, etc. Further due to the same function **Vaayu** acts as **Tantra yantra dharah, Praverta. kas chestaanaa muchaa vachaanaam**.......... .... etc. (C. S. 12/8). Some discrepancy arises regarding the chief seat of **Vaayu**. Charaka mentions **Vastih, pureeshaadhaanam, katih, sakthinee, paadow, astheeni, pakwaasayas cha vaata sthaanam. Tatraapi pakwaasayo viseshena vaata sthaanam.** (C. S. 20/6) that the urinary bladder, large intestines, pelvis, thighs, legs and the bones are the seats of **Vaayu** of which **Pakwaasaya** (colon) is the chief seat.

The **Pakwaasaya** is located below the navel. **Samaana Vaayu** is seated at the navel and as there is no other **Vaayu** at a lower level than the navel other than the **Apaana Vaayu**. Charaka apprently means that **Apaana Vaayu** is the chief **Vaayu** according to the passage quoted above. This ignores the importance of **Praana Vaayu.** From other passages it appears that **Praana vaayu** is the chief **Vaayu** and it should be rightly so as this controls the circulation and respiration, the two most important functions of our body. Chest, the seat of **Praana vaayu**, should under this ctrcumstance be the chief seat of **Vaayu.** That **Pakwaasaya** is the chief seat of **Vaayu** is further corroborated by Susruta and Vaagbhata—**Tatra samaasena vaatah sronee guda samsrayah, Sronee gudayoh uparyadho naabheh pakwaasayah** In brief, the seat of **Vaayu** is between "sroni" and rectum and colon. (S. S. 21/6).

Sthaanam vaatasya tatraapi pakwaadhaanam, viseshatah §
(AH. S. 12/2.)

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* **Astheenicha vaata sthaanam. Atraapi pakwaasaya viseshena vaata sthanam.**

§ There is mention of Mastishka (Brain) in Charaka Samhita Vide Saareera 7. V. 20. Mastishkascha Ardhaanjalihi—meaning Mastishka is half an Anjali.

In addition to this incongruity, it further becomes curious when it is observed that the brain and spinal cord have not at all been mentioned in Aayurvedic literature which are undoubtedly the main seat of **Vaayu** || That cerebrospinal and the autonomic nervous system are the chief structures has undoubtedly been recognised by the **Taantric cult** who made a special contribution to the autonomic nervous system. The brain as the **Sahasraara** is the final and chief seat of all knowledge and function According to **Taantric literature Moolaadhaara**, the seat of which is near **Pakwaasaya** may be regarded to be the starting point of all energies and functions. In that sense **Pakwaasaya** as the chief seat of **Vaayu** may be accommodated but this must be the starting point of activity and not the chief seat.

The cogent reason to ascribe **Pakwaasaya** as the chief seat of **Vaayu** appears to be on therapeutic ground. Enemas, purgatives and emetics are the main agents for purification of body in cases of deranged **Dosha**. Of these agents, enemas are the best for mitigation of **Vaayu**. In the words of Charaka —

Vaate aasthaapanaanuvaasanam–Pakwaasaya manupravischa kevalam Vaikaarikam Vaata moolam chinatti,

Tatra avajite vaate sareeraantargata vaata vikaaraah prasaanti maapadyante,

Yadhaa vanaspatermoole chinne skandha saakhaa praroha kusuma phala palaasaa deenaam niyato vinaasa stadvat. (C. S. 20/12.)

That is, in enemas in derangement of **Vaayu** — the enema entering into the colon destroys the root of any aggravated **Vaayu**, and thereby mitigating **Vaayu** in this region mitigates all aggravated **Vaayu** throughout the body, just as by cutting at the root of a tree, the trunk, branches, twigs, leaves, flowers, fruits etc. are all destroyed.

In this sense **Pakvaashaya** (colon) may be regarded to be the chief seat of **Vaayu.**

From what has been detailed under each of the five **Vaayus**, a grouping can now be attempted to show the general function of normal **Vaayu**. This has been admirably summarised by Susruta **Praspandana, udvahana, poorana, viveka, dhaarana lakshano vaayuh Panchadhaa pravibhakta sareeram dhaarayati.** (S. S. 15/3). Respiration and other movements of the body (**Praspandana**), circulation (**Udwahana**), nutrition maintained by taking in of the food, its digestion, assimilation and supply of the same to every part of the body (**Poorana**), separation of all waste materials from the body and their excretion (**Viveka**), and maintainance of the body (**Dhaarana**), each of these functions is that of each of the 5 **Vaayus** detailed above. Further Charaka mentions. **Samo moksho gatimataami vaayoh karma avikaara jam.** (C. S. 18/42.)

This again includes the same functions eg., effort, respiration, proper action of mind and body, proper flow of Dhaatu and proper excretion. All the functions enumerated in the passages **Vaayuh tantra yantra dharah** etc. –and other passagse quoted above are most adequately represented in the respective groups as shown in the table which at once shows each function being regulated by the respective **Vaayu**.

Function of Abnormal Vaayu

In the table showing the classification of the different forms of **Vaayu** in which the various symptoms and functions have been arranged under respective headings a rich material mainly dealing with the manifestation obtained as a result of derangement of **Vaayu** are indicated. This rich material is gathered from the symptomatology of only a few **Vaataja**d **vyaadhies**. A scrutiny of other **Vaataja vyaadhies**. not considere here eg., **Vaataja siroroga, vaataja hrudroga** etc, will further show that they also manifest a striking analogy to those already mentioned.

Thus the theory that **Vaayu** is nothing but (that which is responsible for) the manifestation of the nervous system is well established.

Properties of Vaayu & Vaayu Temperament.

In all the **Samhitas** Vaayu **swaroopam,**—Properties of **Vaayu** are mentioned at the beginning followed by other characters of Vaayu *i.e.*, seat, function etc. The importance thus given to properties of Vaayu is very often misleading to the beginner, at least that had been so to the present writer. A great stress has been given to the character of Vaayu which constituted **Rookshah seeto laghuh sookshma schalo adha visadah kharah** (C. S 12/3).

This at once indicates that one is speaking of a tangible object which is rough to touch etc. A beginner is puzzled to compare this to the other characters of Vaayu particularly **Amoortitva**, **Sookshmatva and Avyakta**. Only on minute scrutiny it can be gathered that these characters are not those of Vaayu itself but of the persons having preponderence of Vaayu i. e. of Vaayu temperament. This point may now be discussed in detail.

It has repeatedly been mentioned in all Aayurvedic literature that it is the equilibrium of the three **Doshas** viz Vaayu **Pitta** and **Kapha** which maintains the normal body and also all its normal functions. The temperament and other qualities of the mind and body originate and remain normal so long the equilibrium of the **Tridosha** is maintained. Such an individual might be called of having **Sama prakruti** indicating that there is no abnormal prominence of any particular **Dosha.** This condition is termed variously as **Prakruti**, **Swabhaava**, **Swaroopa** etc. Any abnormal prominence of a particular **Dosha** will lead to a series of manifestations, peculiar and constant according to the **Dosha** affected. This abnormality may be either congenital or acquired. Congenital when the abnormality takes place along the growth of the fertilized ovum. Charaka says—

> **Yasya yasya avayavasya beeje beeja bhaaga upa tapto bhavati, Tasya tasya avayavasya vikruta roopam yaayate, Nopa yaayate chatanupa taapaat.** (C. Sa. 3/25.) ∴

Paathaantaram - ∴ Yasya yasyahyangavaynasya beeje beeje bhaava upataplo bhavati, tasya tasyaangaa vayavrsya vikruti rupajaayate,

Nopajaayate chaanupa taapaata.

It becomes acquired due to persistent use of food in abnormal quantities and qualities having stimulating or depressing effect of some particular **Dosha**. (Vide C. B. 6/7). It has furiher been shown that the congential form of abnormal temperament, growing simultaneonsly along with the cells of the body, so alters them that the same temperament persists throughout the life and that without any change. It occurs thus —

> **Sama prakrutih vaata prakrutir nabha vati,**
> **Vaata prakrutih pitta prakrutir nabhavati sama prakru-**
> **tervaa.** (C. S. 7/40.)

Vaayu controls the personality and temperament of an individual by influencing the following qualities.

People differ in many reepects both mentally and physically according to the state of the nervous system. The temperament depends on the stability of the nervous equilibrium of the individual. It is of common occurrence to find two individuals doing the same sort of work, say reading a nove- or engaged in a conversation on a serious topic and some chill dren playing in the room. A shout from a child or even their presence will be annoying to one of the persons and the shout will at once set his mental equilibrium disturbed and probably he will punish the child or drive out all of them. The other individual, on the other hand, will probably pay no heed to the noise of the children, even a child jumping on his person will not be able to provoke any irritation in him. In the former individual the nervous system is in a state of high sensitiveness so that a slight stimulus sets in the whole mechanism in action. This might again be compared to a mob which is in a highly agitated condition a slight stimulus which will not attract any notice to another group of individuals, say those of an excursion party, will provoke the excited mob to usher in a disaster. Persons of **Vaayu** temperament, similarly, have got their nervous system in tension and according to the group of the nervous system affected will show the series of manifestations as detailed in Aayurvedic literature,

It has been noted that the functions of **Vaayu** can be divided under 3 groups: (1) acting on the muscles for the purpose of movements of all forms throughout the body. (2) acting on the glands mainly on the skin (sweat and sebaceous) and of the intestines (digestive secretions), (3) acting on the mind. According to the preponderance of one or more of the above 3 groups of functions affected, the individual of **Vaayu** temperament will manifest 3 main groups of effects. First, when the nerves influencing on the muscular system are in highly sensitive condition the person will show hyperactivity of the muscular system as described by Charaka—all the movements, efforts, including, taking meals and all actions are light, swift, agile. There is also restlessness in joints, eye, eyebrow, jaw, tongue, head, shoulders and limbs. He is also talkative. These functions have been attributed by Charaka to be produced by lightness—**Laghutva**, motility—**Chalatva**, and part of multiplicity-**Bahutva** properties of **Vaayu**. This is shown by the following passage: (C. V. 8/84.)

The vasomotor nerves being in a state of irritation will lead to constriction of the vessels of the skin as what takes place during the cold stage of an attack of malaria and so the individual is always getting shivering and will not like cold. This is due to coldness (**Seetatva**), a property of **Vaayu** as mentioned by Charaka quoted above. The relaxation of the veins leads to their prominence (**Bahukandaraa shiraa prataanaah**).

Due to the second factor, i. e., influencing the secretion in which the secretions particularly those of the skin are diminished, a diminished secretion of the sweat and sebaceous glands leads to roughness of the skin and its appendages, i. e., hair, nail, etc. The absence of the sebum leads to cracks and fissures of the skin. Diminished quantity of secretion producing dryness of the throat and larynx will lead to a rough, low-pitched, hoarse and indistinct voice. All these have been attributed by Charaka to be due to the dryness (**rookshmatya**) roughness (**paarushya**), and non-slippery character (**vaishadya**) of **Vaayu**. These have been well described in the above passages quoted from Charaka.

Thirdly, increased influence on the mental functions, leads to quick excitement of the physical and mental inclination, also disappointment. The individuals quickly get fear, anger and aversion. They can grasp any problem quickly but forget equally qickly. This is produced by the property of quickness **(Seeghratva)** of **Vaayu**:

It requires further study to explain how an individual of **Vaayu** temperament becomes lean and short in stature, how he gets less strength, or less longevity, less children, less vitality and less wealth as detailed by Charaka, and also how he becomes dishonest, jealous, thievish, ungrateful and unsteady in friendship and also possessing character like goats, jackals, hares, rats, camels, dogs, vultures, crows and asses as described by Susruta.

Causes for the Derangement of Vaayu

The causes mentioned in the **Samhitas** are quite definite and all lead to either hyperstimulation or depression of the nervous system. They are; (1) fighting with a stronger individual, (2) excessive exercise, (3) sexual excess, (4) excessive study with loud reading, (5) fall, (6) excessive running, (7) excessive massage of the body, (8) excessive jumping, (9) sudden jumping, (10) excessive swimming (11) keeping nights, (12) carrying excessive load, (13) constant riding on horse, elephant or carriage, (14) excessive walking, (15) excessive eating of various substances which influence **Vaayu**, (16) fasting, (17) irregularity of meals regarding quantity, quality and time, (18) intake of food before proper digestion of previous meal, (19) forcible restraint on the action of sphincters as well as of sneezing, cough, vomiting, etc. **Tatra balavadvigrahaati vyaayaama............prakopa maapadyate.** (S. S. 21/23–24.)

It appears that all the above causes are nothing but over-excretion and hence overstimulation of the nervous system. The only item "fasting" may act as a depressent to the nervous system.

Many of the above factors have been mentioned as causes of **Vaayuksheena.** It appears that all these act by hyperstimulation followed by depression of the nervous system.

CHAPTER XIV

FIVE KINDS OF PITTA

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[CONTENTS :—Functions of normal Pitta—Seats of Pitta—Forty kinds of symptoms due to abnormal Pitta—Bhraajaka Pitta—Symptoms due to Secretion of Sebum.—Infective and Suppurative processes—Paachaka Pitta—Ranjaka Pitta—The role of Ranjaka Pitta in the formation of Red cells (Erythropoiesis)—Significance of immature red cells (Abnormal Erythropoiesis)—Ranjaka Pitta, the factor essential for Red blood cell formation—Role of the Liver in Erythropoiesis—Ranjaka Pitta and the disposal of the dead bodies of the red cells—Conclusion—Summary—Rakta Pitta—Aalochaka Pitta—Saadhaka Pitta—The Suprarenal Glands—The Pituitary Gland—The Pancreas—Conclusion—Pitta Temperament—Causes of Derangement of Pitta - Pitta as Agni—Bhootagni—Paachaka Pitta or Paachakaagni—The Gastric Juice—Pancreatic Secretion—The Intestinal Juice—Bile—The Large Intestine—The Mechanism of Digestien—Dhaatwagni—Kaayaagni or Dehaagni—Maintenance of Constant Body Temperature—Sensation of Temperature, Burning Sensation etc.,]

The basis for the study of Pitta has been as follows :—

(1) Materials collected from the **Samhitas**.

(2) Grouping of the above materials under appropriate heads.

(3) Arranging these groups according to 5 kinds described in the **Samhitas**.

(4) Seat of **Pitta**.

(5) General function, normal and abnormal, explained.

(6) Properties of **Pitta** and the temperament due to preponderance of **Pitta.**

(7) Causes of derangement.

The material available for classification with a view to determine the nature of Pittas is detailed below,

Functions of Normal Pitta (Praakruta Pittasya Kriyaa.)

Agni *reva sareere pithaanthargata kupithaa kupithah subhaasubhaani karoti. Tadyaddhaa—pakti mapaktim, darsana madarsanam, maatraa maatratwam ooshmanah, Prakruti vikruti varnow, sauryam, bhayam. krodham, harsham, moham, prasaadamiti eva maadeeni, cha, aparaani dwandwaaneeti. (C. S. 12/15.)

The fire which exists in the body as **Pitta** being normal or abnormal, as the case might be, produces good or evil. Thus **Pitta** produces digestion or indigestion, vision or blindness, normal or abnormal temperature of the body, normal or abnormal colour of the body, courage or cowardice, fear or bravery, anger or the reverse, pleasure or displeasure, ignorance or knowledge, satisfaction or dis-satisfaction.

Darsanam pakti rooshmaa cha kshuttrushnaa hdemaardavam I Prabhaa prasaado medhaa cha pitta karmaavikaarajam. (C. S. 18/43.)

Sight, digestion, heat, hunger and thirst, softness of the body, radiance, cheerfulness, intelligence are the functions of normal **pitta.**

Raaga paktwojas tejo medhoshma krut pittam panchadhaa pravibhaktam agni karmanaanugraham karoti. (S, S. 15/4.)

Colouration, digestion, producing **ojas**, strength, intelligence and heat-these are produced by **pitta** which divides into 5 forms.

The five Pittas

Paachaka Pittam (Lit. that which digests)

Tachaa dushta hetukena viseshena pakwaamaasaya madhyastham pittam Chaturvidham annapaanam pachati, vivechayati cha dosha rasa mootra pureeshaani ; tatrastha-meva chaatma Paktwaa seshaanaam pittasthaanaana am sareerasya cha agnikarmanaanugraham karoti, Tasmin pitte paachako agniriti samgnaa.

(The **Paachaka Pitta** is situated between stomach and colon and digests the four kinds of food, separates them into chyle, urine and faeces, and provides fire to the body.)

Ranjaka Pittam (Lit. that which colours).

Yattu yakrut pleehow pittam tasmin ranjako agni riti samgnaa, sa rasasya raaga kruduktah.

(**Ranjaka Pitta** is situated in the liver and spleen and is called **Ranjaka Pitta**. This imparts red colour to **Rasa** (chyle).

'**Saadhaka Pitta**' (Lit. that which helps)

Yat pittam hrudaya samstham tasmin saadhako agniriti samgnaa, so abhipraardhita manoradha saadhana kruduktah.

(The **Saadhaka pitta** is situated in the heart and is called **Saadhaka** fire. This serves to fulfil one's desire.)

Aalochaka Pittam (Lit. that which gives vision).

Yed drushtyaam pittam tasminnavaloko agniriti samgnaa, sa roopa grahanaadhikrutah.

(The **Aalochaka Pitta** situated in the eye is called **Aalo-chaka** fire. This gives vision.)

Bhrajaka Pittam (Lit. that which shines).

Yattu twachi pittam tasmin bhraajako agni riti samgnaa, so abhyanga parisheka avagaaha avalepanaadeenam kriyaa-dravyaanaam paktwaa chaayaanaam cha prakaasakah !

(The **Braajaka pitta** is situated in the skin and is called **Braajaka Agni.** This allows the unguent to enter inside the skin when rubbed or anointed, and also imparts natural glow and complexion to the skin).

(21) (S. S. 21/10—14)

The English equivalents of these terms are given in the table below:

These manifestations, on classification, can be grouped under **5 groups** according to the 5 forms of **Pitta** enumerated above and also their respective seat of occurrance.

Table 1 showing the manifestations of normal **Pitta**

Reference	**Paachaka Pitta** (that which degests)	**Ranjaka Pitta** (that which colours)	**Saadhaka Pitta** (that which helps)	**Aalocaka Pitta** (that which gives vision)	**Bhraajaka Pitta** (that which shines)
Agni reva etc. **C. S. 12/15.**	**Pakti mapaktim**-digestion, indigestion.	**Prakruti vikruti varnow**–normal and abnormal colour of body.	**Souryam, bhayam, Krodham, harsham, moham, Prasaadam**– Courage or cowardice, fear or bravery, anger or the reverse, pleasure or displeasure. **Moha amoha**–Satisfaction or dissatisfaction.	**Darsana madarsanam**–Vision or loss of vision.	**Maatra maatrancha oushmanah**–Normal or abnormal temperature of the body.

Darsa. nam etc. **C. S. 12/43**	**Pakti**—digestion **Ushma**—heat **Kshu ttrushnaa**-hunger and thirst	—	**Prasaada**—Cheerfullness **Medhaa**—Intelligence	**Darsanam**—Sight	**Deha maardavam**—Softness of the body **Prabhaa**—Radiance
Raaga paktwoja etc. **S. S. 15/4**	**Paktwoja**—digestion Producing ojas	**Raaga**—Colouration	**Teja**—Strength **Medhaa**—Intelligence	—	**Ushmaa**—Heat (body temperature)
The 5 **Pittas Pancha vidha pitta S. S. 21-10-24**	**Chaturvidha annapaanam pachati, Vivechayati cha, dosha, rasa, mootra, pureeshaani, agni karmaanugraham karoti**—Digests the 4 kinds of food and separates the products into **Dosha, Rasa,** urine and faeces acts as the fire.	**Rasasya raaga krut**—Which imparts the red colour to **Rasa.**	**Abhi praardhita manoradha saadhana krut**—Which serves to fulfil one's desire.	**Roopa grahanaadhi krut**—Which allows one to see.	**Abhyanga, parisheka, Avagaaha, avalepanaa dinaam kriyaa dravyaanaam paktwaa Chaayaanaam cha prakaasakah**—This allows the unguent to enter inside the skin when rubbed or anointed and also imparts natural gloss and complexion to the skin.

Table 2 showing the seat of 5 kinds of **Pitta**

Swedo etc. **C. S. 20/8**	**Aamaasaya**–Stomach	**Rasa**–Chyle	**Rudhira**–Blood	**Laseeka**–Body water	**Sweda**–Sweat
Pittasya etc. **S. S. 21/6,7**	**Pakwaamaasayor madhye**–between colon and stomach i. e. small intestine.	**Yakrut pleehaanow**–Liver and spleen.	**Hrudayah**–Heart	**Drushti**–Eye	**Twak**–Skin

Table 3 showing manifestations of abnormal **Pitta**

Pitta kshaye S. S. 15/6	**Agni maandya, amlodgaara, ruk, galaa, aamaasaye, jwaalaa, trushnaa, ityaadi**– Indigestion, acid eructation etc.	**Rakta pittam, yakrut pleehaa vikrutih**– Haemorrhage, disorder of liver and spleen	**Chintaa sakter naasa tandraa** Loss of mental function, stupor	**Drusti naasa**– Loss of vision	**Charma roga charmano avnara vikruti, ushma-alpataa prabhaa haani**– Skin disease, disorder in the pigmentation of skin, Subnormal temperature, Loss of glossy appearance
Pittera vrudhi hadale S.S. 15/13		**Peeta varnataa, mala mootra yoh swedesya peeta varnataa** Jaundice colouration of faeces, urine and sweat	**Nidraa alpataa, moorchaa, bala-haani, indriya dourbalya** Sleeplessness, unconsciousness, weakness, Weakness of senses	—	**Santhaapa seetakaamataa**

Forty kinds of symptoms due to abnormal Pitta.

[Chatwaarimsat Pitta Vikaaraah.]

1 Oshah, 2 Ploshah, 3 Daahah, 4 Davadhuh, 5 Dhoomakah, 6 Amlakah, 7 Vidaahah, 8 Anthardaahah, 9 Angadaahah (Amsadaahah), 10 Ooshmaadhikyam, 11 Atiswedam, 12 Anga swedam, 13 Angagandhah, 14 Angaavadaranam, 15 Sonita kledah, 16 Maamsa kledah, 17 Twagdaaha, 18 Maamsa daahah, 19 Twangmaamsaavadaranam, 20 Charmaavadaranam, (Charma dalanam.) 21 Rakta kothakah. 22 Rakta pittam (Rakta Visphotam) Rakta mandalaani, 23 Haritatwam, 24 Haaridratwam, 25 Neelikaa, 26 Kakshyaa, 27 Kaamalaa, 28 Tiktaasyataa, 29 Pootsimukhataa, 30 Trushnaadhikyam, 31 Atruptih, 32 Aasya vipaakah, 33 Galapaakah, 34 Akshipaakah, 35 Gudapaakah, 36 Medhra paakah, 37 Jeevaadaanam, 38 Tamah pravesah, 39 & 40 Harita, haridra, netra, mutra, Varchastwam.

Iti chatwaarimsat pitta vikaaraah, Pitta vikaaraanaam aparisankhyeyaanaam aavishkrutatamaah. (C. S. 20/13.)

A scrutiny of the above quoted passages including 40 symptoms due to abnormal Pitta shown in table No. 4, (p. 110) shows that they can be classified under the following 6 groups.

1. Symptoms due to burning sensation, rise of temperature and perspiration. 2, Symptoms due to normal and abnormal secretion of sebum or infective and suppurative processes of the skin. 3. Symptoms due to disturbance of digestion. 4. Pigmentation, haemorrhage, and jaundice. 5. Intelligence, courage, fear etc. and 6. Vision.

Table 4 showing 40 kinds of symptoms due to abnormal PITTA:--

1 Symptoms due to burning sensation, rise of temperature, perspiration (**Teja, Uushmaa**)	2 Symp. due to secretion of sebum (**Prabhaa**)—infective and suppurative process of the skin	Symp. due to disturbance of digestion	4 Pigmentation, hæmorrhage and jaundice (**Raaga**)	5 Intelligence, courage, fear etc. (**Medhaa**)	6 Vision (**Darsanam**)
1. **Osha** (Sensation as presence of fire by the side) 2. **Plosha** (Sensation as in burn) 3. **Daaha** (burning sensation all over body) 4. **Davadhu** (as in severe burning all over body) 5. **Dhoomaka** (as if smoke is coming out of body)	11. **Atisweda** (excessive perspiration) 12. **Angasweda** (local persipiration) 13. **Anga gandha** (bad odour of body) 14. **Angaavadarana** (cracking of local areas) 15. **Sonita kleda** (suppuration)	6. **Amlodgaara** (acid eructate) 7. **Vidaaha** (burning from acidity) 28. **Tiktaasyataa** (bitter taste in mouth) 29. **Pootimukhataa** (bad odour in mouth) 30. **Trushnaadhikyam** (excessive thirst)	21. **Rakta kota** (red patches) 22. **Rakta Pittam**) **Rakta mandalaam**. hæmorrhage) 23. **Haritatwa** (Jaundice green) 24. **Haridratwa** (jaundice yellow) 25. **Neelikaa** (black spots)		**38 Tamah pravesa** (Dimnes of vision)

8. **Anthardaaha** (internal burning sensation) 9. **Anga daaha** (in some local area) 10. **Ushmaa-dhikya** (rise of temperature) 17. **Twagdaaha** (burning sensation of skin) 18. **Maamsa daaha** (burning sensation of muscle)	16. **Maamsa kleda** (suppurative muscle) 19. **Twangmaam-saavadaraan** (cracking of skin and muscle) 20. **Charmaava-daarana** (cracking of inner layers of skin) 26. **Kakshyaya** (cracking of muscle and skin of armpit) 32. **Aasya Paaka** 33. **Gala Paaka** 34. **Akshi Paaka** 35. **Guda Paaka** 36. **Medhra Paaka**	31. **Atrupti** (non-satiety after meal) } suppuratioon of mouth, throat, eyes, rectum and penis.	27. **Kaamalaa** (jaundice) 37. **Jeevaa-daana** (loss of blood or loss of vitality)	39 **Harita etr mootratwam** (green colouration of eyes, urine and and stool) 40. **Haridra netra mootra-twam.** (yellowish colouration of eyes, urine and stool).

Now let us discuss the physiological basis of the headings in each group representing the 5 forms of **Pitta** with a view to explain the symptoms grouped under them.

Bhraajaka Pitta.

The manifestations mentioned in the first and second columns are due to the action of Bhrajaaka Pitta and are responsible for 24 symptoms out of 40 i. e., more than half of all symptoms due to derangement of **Pitta**. It appears thus that in abnormality of **Pitta** it is the **Bhraajaka Pitta** which is affected most. Of the 10 symptoms mentioned in the first column, one notices only one (No 10) causing a rise of temperature while the remaining 9 are indicative of burning sensation in various ways. How the burning sensation and rise of temperature take place have already been elaborately discussed in connection with the description of Kayaagni or Dehaagni (Indian Medical Record, December 1942), where we have observed that the sweat glands of the skin are responsible for all these symptoms.

Symptoms due to secretion of sebum : Infective and Suppurative processes.

In the skin there exists another set of very important glands, the sebaceous glands attached to every hair follicle, playing an important role in animal life. The cells of these glands are continually being charged with fatty matter and the secretion, called the sebum, is discharged outside acting as a lubricant to the hairs. The female breast is only a modified sebaceous gland.

It appears thus that in normal condition the sebum continually coming out of the hair follicles gives the glossy appearance of the skin and so the **Kaanti** of the body. When these are deranged we find the symptoms mentioned in the second column above constituting 14 symptoms out of 40 symptoms of abnormal **Pitta**.

The normal **Bhraajaka Pitta** maintains the normal glossy appearance of the skin and gives it the softness and freshness by the secretion of the sebum from the sebaceous glands. In case of abnormality of this secretion there is bad odour of the body, the skin becomes rough and cracklings appear due to

the dryness of the skin. The skin thus becomes rough with cracks and deprived of the protective fluids of secretion is naturally exposed to infections and when infected cannot effectively protect itself from the same, thus leading to the formation of septic and suppurative processes. **Teja, Ushma, Prabha etc.** detailed in the first and second columns of the table then represent **Bhraajaka Pitta** which, again, represents the secretions of the sweat and sebaceous glands of the skin.

Paachaka Pitta

Paachaka Pitta has been described in detail while dealing with "**Pitta** as **Agni**" (see below) where it is indicated that ferments present in the digestive secretion are the **Paachaka Pitta.**

In the process of digestion **Pitta** constitutes only the digestive enzymes in the secretions of the different parts of the alimentary canal. This can be effective only when **Vaayu** and **Kapha** come to the help of **Pitta.** In fact the guiding force is **Vaayu,** and so Sarangdhar rightly says;

> **Pittam pangu Kaphah Panguh Pangavo Mala Dhaatavah; Vaayunaa Yatra neeyante tatra gachchanti meghavat**
> **(Sarangdhara - Purva. 5 chap.)**

Vaayu and **Kapha** help **pitta** in the following way.

The taste of the food is recognised by **Bodhaka Kapha.** The chewing of the food is done by the **Vyaana Vayu,** swallowing by **Praana vaayu.** The activities of all the glands of the alimentary tract i e., **Pitta** and also the movements of this tract by peristalsis, allowing the food to pass through the length of 22 ft. of the alimentary tract so that time is gained for digestion to take place, are all maintained by **Samaana vaayu.** The excretion of undigested material, the faeces, is done by **Apaana vaayu.** Throughout the digestive tract from the mouth to the anus, the mucus, the **Kledaka kapha** is being secreted which makes the food slippery, moist and exposes to be acted on by **Pitta,** the digestive secretions.

This whole mechanism has been very admirably described in a very few words by Charaka thus : —

Aahaaraparinaamakaraa Stvime Bhaavaah bhavanti–Tadyadhaa – Ushmaa, vaayuh, kledah, Snehah, Kaalah. Samayogascheti (C. S. 9/6—14.)

i. e., the heat of **Paachaaka Pitta**, **Vaayu**, mainly the **Samaana vaayu**, mucus the **Kledaka kapha**, the time taken by the meal to traverse the whole digestive tract and the proper combination of all of them, are the factors for digestion of food.

Charaka describes this further thus : —The **Praana Vaayu** holds the food when taken and sends the bolus to **Koshta.** There it is moistened, broken up and made soft by the **Kledaka kapha.** The **Saamaana vaayu**, exiting the fire, digests the food in due time.

Annamaadaanakarmaatu praanah Koshtam prakarshats taddravairbhinnasanghaatam Snahena mridutaam gatam, Samaanena avadhutognirudaryah Pavanenatu Kalebhuktam samam samyak pachaa tyaayurvivruddhaye.

[C. chi. chap. 15 - v 4, 5.]

RANJAKA PITTA

The role of Ranjaka pitta in the formation of red cells [Erythropoiesis]

The development stages of red cells in the adult takes place in the bone marrow and proceeds from megaloblasts to the next stage, in the order, early, erythroblast, late erythroblast, normoblast, reticulocyte and erythrocyte. Of these, all excepting the last two stages are nucleated. Of the nucleated erythron, again, the proportion in normal bone-marrow, is that the megaloblasts are extremely scanty, early erythroblasts 1–4 per cent, late erythrohlasts 25–30 per cent and normoblasts about 70 per cent. This relation alters to a great extent in pathological conditions. The morphological characters of these cells may be described here briefly.

Each individual unit or wagon, for the collection of oxygen from the inexhaustible source, the atmosphere, and its transport to every individual cell of our body is called the erythron. Just as the transport wagons in a railway yard show themselves to be of various forms, shapes and sizes similarly in the animal body the erythrons are of various forms, shapes and sizes. The erythrons include not only the circulating red cells, the erythrocytes but also their precursors in the bone-marrow, viz., the megaloblast erythrobast, normoblast, reticulocyte, and also the transitional forms between these developmental stages. The functions of carrying oxygen by these cells depend on the haemoglobin contained in them, but all these cells do not contain hæmoglobin, nor does the early erythroblast. The hæmoglobinised megaloblast is now regarded to be always pathological.

The **megaloblasts**, extremely few in number in normal bone marrow, about 10-12μ in diameter often with irregular cell-outline possess a non-granular deeply basophilic cytoplasm and a large pale nucleus occupying more than half the cell with reticular thread of nucleoplasm. The **early erythroblast** resembles the megaloblast but is smaller in size, 8–10μ and contains denser nuclear chromatin. The megaloblast and the early erythroblast do not contain haemoglobin and multiply by karyokinetic division. All the other cells of the erythron contain haemoglobin and do not divide. The **late erythroblast** is smaller, shows condensation of the nuclear chromatin, contains small amount of haemoglobin with lessening of the basophilic staining of the cytoplasm. The **normoblast**, the ripened stage of the preceding form, shows much reduction in size about 8μ more accumulation of haemoglobin and more condensation of the nuclear chromatin, making the nucleus homogeneous and of uniform density. **The reticulocyte** is characterised by the absence of nucleus, which is either extruded or lost by fragmentation or solution, and presence of reticular material of the cytoplasm demonstrable by supravital staining It contains the full amount of haemoglobin and so stains deeply with eosin. The **erythrocyte**, or the normal red blood cell, is full of haemoglobin and possesses no reticular material.

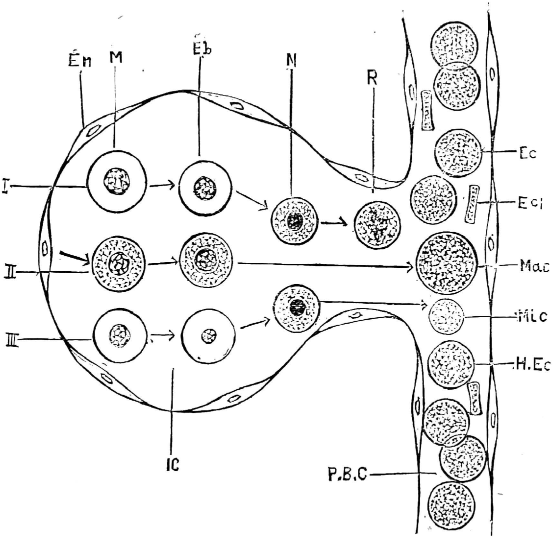

Figure showing Normal and Abnormal Erythropoiesis

IC—Intersinusoidal Capillary of the Bone Marrow ; P.B.C.—Peripheral Blood Capillary.

I NORMAL ERYTHROPOIESIS—En—Endothelial cell M—Megaloblast, Eb—Erythroblast, N—Normoblast, R—Reticulocyte, Ec—Erythrocyte (red blood cell). Ecl—Erythrocyte seen from the side.

II ABNORMAL ERYTHROPOIESIS due to deficiency of **Ranjaka pitta**, the haemopoietic principle showing early haemoglobinisation of the megaloblast and the erythroblast with direct production of Mac—the macrocyte and great reduction of the number of the red cells.

III ABNORMAL ERYTHROPOIESIS due to deficiency of the Extrinsic factor showing either a Mic—the microcyte or H, Ec—the hypochromic erythrocyte.

The developmental stages thus constitute a progressive diminution in the size of the cell, a gradually increasing accumulation of hæmoglobin and a gradual ripening and final disintegration of the nucleus.

All the blood cells, the erythrocytes, the lymphocytes, the monocytes and the granulocytes develop from some undifferentiated reticuloendothelial cells. When these undifferentiated cells show partial differentiation the blood cells are called the "blast" cells. Thus there may be 4 blast cells at this stage, the megaloblast, the lymphoblast, the monoblast and the myeloblast. All the blast cells are found in the marrow and not in the peripheral blood. They appear in the blood when complete differentiation takes place. Thus the developmental stages of the blood cells can be represented in a tabular form.

Undifferentiated phase	Reticulo-endothelial cells			
Partial differentiation	Megaloblast	Lymphoblast	Monoblast	Myeloblast
Complete differentiation	Erythrocyte	Lymphocyte	Monocyte	Granulocyte and Clasmatocyte

There are several hypotheses regarding the theories of blood formation. Some advocate the above classification, accepting four blast cells. Those of the trinitarian hypothesis accept three blast cells placing the monoblast as included under myeloblast. Those of the dualistic hypothesis accept two blast cells, myeloblast and lymphoblast. Here the megaloblast is included under myeloblast and monoblast under both myeloblast and lymphoblast. There are others, again, who advocate the unitarian hypothesis with haemocytoblast as the " blast " cell which on complete differntiation produces all the blood cells. Thus there are two schools of thought, one the monophylectic school advocating the unitarian hypothesis and the rest belong to the polyphylectic school.

In the human embryo, the blood cells originate first from the area vasculosa of the yolk sac, later they originate from the body stalk and placental site, later still from the liver and spleen, and finally from the bone-marrow. In early intra-uterine life the formation of blood cells is most active in the liver and spleen. Our knowledge of the formation of blood cells from the liver and spleen is of recent origin. It is astonishing to find that Susruta (2100 B.C.) knew this as we find mention in Susruta Samhita (Sutrasthanam, 21/16 and Sarirasthan, 4/25.)

Sonitasya sthaanam yakritplehaanou gharbhasya yakrit pleehanou sonitajou—the seat of blood is liver and spleen. Further, in utero, liver and spleen originate from blood.

How the blood forms, has been studied exhaustively in the chick embryo.

The blood cells, the megaloblasts, appear first in the area vasculosa on the third day in the chick embryo. These blood cells are derived from groups of cells, the blood islets, which lie free in the lumen of the blood vessel of the area vasculosa. These blood islets, in their turn, are derived from proliferation of the endothelial cells lining these primitive vessels. The reticulum cells of the primitive reticuloendothelial system, indistinguishable histologically from the endothelial cells, and generally placed outside the primitive vessels produce the primitive white blood cells, the myeloblast, monoblast and the lymphoblast. These enter the lumen of the vessel by passing through the vessel wall as these cells are motile. The megakaryocytes are also believed to be extravascular in origin.

This may be represented in the following table.

Reticuloendothelial cells.

From reticulum cells (extravascular) — From endothelial cells (intravascular)

From reticulum cells (extravascular): Myeloblast, monoblast, lymphoblast, Megakaryocyte

From endothelial cells (intravascular): Megaloblast

All the blood cells commence to form in the bone marrow about the fifth month of foetal life, thus relieving the other structures as blood-forming organs. The formation of erythrocytes and granulocytes ceases shortly after birth. The liver, spleen and the pelvis of the kidney, however, may again regain their blood-forming function in severe anaemias or great loss of blood, particularly in infants In the adult, the erythrocytes and the granulocytes and the megakaryocytes are exclusively formed in the bone marrow, the lymphocytes mainly from the germinal centres in the lymphatic tissue and only partly in the marrow, the monocytes from the reticuloendothelial cells of the spleen, bone marrow and liver, particularly the spleen. Bone marrow thus plays the chief role in the formation of blood cells. The marrow of all the bones remains actively hæmopoietic thus appearing red up to the age of four years. It becomes less active, thus appearing pale-red and fatty about the age of seven. Starting from the age of ten until the age of twenty, the actively hæmopoietic red marrow gradually becomes more and more fatty as evidence of inactivity, ultimately the whole shaft becomes filled up with yellow marrow. In the adult the red marrow persists in order of amount in the vertebræ, sternum, ribs, femur and tibia. In anæmia in the adult, erythropoiesis takes place in the liver and spleen. The life of a red cell is about 3—8 weeks, granulocytes about 5 days, lymphocyte less than a day, blood platelets about 4 days.

Significance of immature red cells (abnormal erythropoiesis)

It has already been mentioned that all the 'blast' cells are found in the marrow and not in the peripheral blood. The erythrocytes, the product of complete differentiation and reticulocytes (less than 1 per cent of all red cells) are the only erythron in the peripheral blood. Immature red cells found in peripheral blood are always indicative of a pathological condition. They are mainly the following :

(1) **Nucleated cells.**—These are found normally in peripheral blood in the new born and in the foetus. They appear in the

adult as a process of over-activity of the haemopoietic system for regeneration of the lost or destroyed corpuscles. The more active the marrow the more the increase in the number of the circulating nucleated cells. Normoblasts may appear in "showers" called normoblastic crisis. The type of the nucleated cells is of greater clinical significance than their number. Megaloblasts and erythroblasts, particularly when haemoglobinised, indicate the tendency to revert to a more foetal type of blood regeneration and are found mostly in pernicious anaemia and also in other anaemias and myeloid leukaemia. Normoblasts may be found in any severe anaemia. (2) **Reticulocytosis.**—A fresh specimen stained supravitally with brilliant cresyl blue gives the appearance of reticulocytes as containing a net-work of blue staining material either granular or in the form of fibrils. These are normally present in about 1 per cent of the red cells. The number rises in anaemias and may be more than 50 per cent. The phenomenon of increase in the number of reticulocytes is an indication of increased activity of the bone marrow and the reticulocyte count indicates the degree of the activity of the marrow. In blood regeneration, as in successful treatment of pernicious anaemia, the reticulocyte count may rise to 50 per cent of the red cell count. The reticulocyte is the stage between the normoblast and the erythrocyte during the process of normal formation of red cells physiologically or in abnormal regeneration. A sudden increase in the number of the reticulocytes, the "reticulocyte crisis" can be obtained in pernicious anaemia by a single massive dose of liver extract given either orally or parenterally. The "crisis" usually takes place after an acute haemorrhage and may be of diagnostic importance in unsuspected or concealed haemorrhage. (3) **Cells of abnormal size.**—When larger than normal (8-13 μ) they are called *macrocytes* or *magalocytes*, when smaller than normal (4-6.5 μ), *microcytes*, when great variation in the size of red cells occurs the condition is known as *anisocytosis*. **Spherocytosis** is the condition of abnormally thick red cells which stain very densely. **Abnormalities in shape.**—These are most commonly, the **poikilocytes**, characterised by pear shape. The macrocytes and microcytes often show irregular outline. **Sickle shaped cells** as found in sickle-cell anaemia and the **oval cell** (the normal appearance of erythrocyte

in the camel) as seen in ovalocytosis are hereditary anomalies of shape. **(5) Staining abnormalities.**—The red cells are usually stained by (a) Leishman stain, when the red cells take a homogeneous eosin colour. When the Hb. content is less the staining is less intense or may have the central thin portion of the red cell not stained at all. These poorly stained cells are called **hypochromic.** Polychromatic or **Polychromatophillia** is the condition when the red cells take a diffuse purple colour all over the cell. **Stippling** or basophile punctation is the condition in which blue dots, fine or coarse, appear in the cell. These as well as the polychromasia indicate immaturity of the red cell. (6) Nuclear remnants are often found in the form of the Cabot ring and the Howell-Jolly bodies. Cabotring appears as round or figure-of 8 purple ring inside the red cell. Howell-Jolly bodies are reddish blue fragmants present inside the cell formed by karyorrhexis of the nucleus of the normoblast. These also indicate immaturity of the cell.

Ranjaka Pitta, The Factor Essential, for Red Blood Cell Formation.

Production of red cells depends on several important factors. These are mainly the haemopoietic principle, and internal secretion. The haemopoietic principle **(Ranjaka Pitta)** is the combination of 2 main factors—(1) the extrinsic factor supplied by food, and (2) the intrinsic factor supplied by the stomach. This is absorbed from the intestines and stored in the liver.

(a) The extrinsic factor, also called the nutritional factor. This consists chiefly of iron, copper and vitamins all derived from food. The value of the food so far as iron is concerned requires the presence of iron in available form as iron combined with pyrrole-derivatives are not "available." Liver, brown bread, oat meal, dried fruits, green vegetables, peas, beans etc, constitute the best source of "available iron". Milk, fish, red meats, chicken, white bread have either poor iron content or little available iron. It appears thus that vegetable diet supplies more iron than meat diet. The average mixed diet must contain at least 15 mgm. of iron per day. Women require more iron than men. Iron is

necessary for production of haemoglobin and the iron set free by disintegration of haemoglobin is again utilised for the production of the same again and also bile. The bile pigment thus produced plays an important part. The chlorophyll of the green vegetables also plays an important role in the absorption and utilization of iron.

The anaemia produced by deficiency of iron as the factor for erythropoiesis is therefore **microcytic** and **hypochromic** showing low color index and low mean corpuscular haemoglobin. Poikilocytosis is also present.

The conversion of inorganic iron into haemoglobin is greatly aided by the presence of copper and other metals in the food particularly calcium either actively as a catalytic agent or helping the conservation of iron Thyroxine also plays a role.

Vitamin C, the antiscorbutic vitamin, like iron supplies the extrinsic factor, the deficiency of which leads to microcytic anaemia. Vitamin B complex (*e. g.*, from marmite) also supplies the extrinsic factor and cures macrocytic anaemia particularly of tropical nutritional anaemia.

(b) The intrinsic factor is supplied by the gastric juice and is of ferment-like character. The interaction of this gastric intrinsic factor with the dietetic extrinsic factor produces the haemopoietic principle which is then absorbed from the intestine and stored in the liver. There is a definite relation between the pepsin-hydrochloric acid secretion and the secretion of the intrinsic factor. The failure of intrinsic-factor secretion is invariably associated with achlorhydria and it has been observed that the site of secretion of this factor is mostly in the pyloric portion of stomach and the Bruner's glands of the intestine, the cardiac end and the body of the stomach being almost inactive. The intrinsic factor is absent in pernicious anaemia, after total gastrectomy, some cases of cancer stomach and sprue.

The anaemia produced as the result of failure of the intrinsic factor is of macrocytic and hyperchromic type in contrast to the

microcytic hypochromic type due to absence of the extrinsic factor. The relation of the haemopoietic principle and erythropoiesis is shown in the figure.

Experiments by different workers have shown that the intrinsic factor is probably a ferment and is produced by the reaction between certain proteins *e. g.*, beef with normal gastric juice although the factor is present in neither the normal gastric juice nor in beef protein. The beef protein incubated with gastric juice from pernicious anaemia does not produce the factor. This factor is not pepsin and is not present in saliva nor in duodenal secretion.

The haemopoietic principle exists in the liver but not in that of pernicious anæmia but returns to the liver in such cases after liver feeding. The liver of normal persons, as well as of patients suffering from diseases other than anæmia contains the principle, but not when suffering from diseases of the liver such as cirrhosis, etc., indicating that the liver cannot store the principle when diseased.

The hæmopoietic principle after its formation in the intestine must be absorbed and stored in the liver to perform its function. Any affection which hinders its absorption must necessarily produce anæmia. This explains the anæmia due to intestinal disorder, particularly of bacterial and helminthic origin, which destroys the intrinsic factor Any gross damage of the liver interferes with the proper storage of the hæmopoietic principle producing macrocytic anaemia.

Role of the liver in erythropoiesis

Blood is produced in the bone marrow. In anæmias, pernicious anæmia in particular, bone marrow refuses to do its function of forming red blood cells. The result is death, sooner or later. It had been observed before Minot that HCl of the stomach had been deficient in cases of pernicious anaemia, so HCl treatment was in vogue and that with good results. Splenectomy did a lot of good, some with blood transfusion. But the ultimate result is inevitable. Death follows with only slight temporary improvement preceding it.

Minot compared the manifestations—upset digestion, sore mouth, nervous trouble, etc. of pernicious anæmia with those of pellagra and sprue. The similarity was striking. It had been reported that beneficial results have been obtained in sprue with a diet rich in liver. A further study on liver pointed out that in the zoo the lion cubs, when fed on lean meat got rickety, but when fed on liver, bones and fat they grew rapidly and vigorously. This led Minot to feed his patients suffering from pernicious anæmia with liver. His experiments on 10 private patients gave very favourable results. He requested Murphy to try the same in the hospital. In 1926 Minot and Murphy announced that 45 pernicious anæmia cases, may in their last stages, had been saved by liver therapy alone.

The stored **Ranjaka Pitta**, i.e., the haemopoietic principle has thus been utilized in the treatment of anaemia with liver. Attempts have been made to extract the principle and that with very promising results. Dakin and West (1935) obtained a highly active substance called **anahaemin**, a polypeptide in nature. They have been able to isolate a principle more active than anahæmin by making the polypeptide glucosamine free. Thus efficient extracts have been prepared both in liquid and solid form suitable for parenteral administration.

The curative effect of ventriculin, an extract of autolyzed wall of stomach, in pernicious anæmia supports the view of the two Vagbhatas that the seat of **Ranjaka Pitta** is the **amasaya** the stomach.

So far we have discussed the physiology of erythropoiesis. It has been observed that the life of a red cell is about 3 weeks. That means that all the corpuscles in the human body, about 25,0000,0000,0000 in number will all be destroyed in about 3 weeks. On the other hand the number of red cells at any time in the blood is always surprisingly constant. Thus the bone marrow is so adequately activated normally that numbers of destroyed cells must be regenerated exactly in the same proportion so that a count of 5,000,000 per cmm.

with about 15 grm. of haemoglobin per 100 c. c. of blood, is constantly maintained. This activity is immediately increased when there is sudden loss of blood due to haemorrhage or haemolysis, by increased erythropoiesis. The activity of the bone marrow reverts to its normal level as soon as the normal number of red cells in the blood is restored. What directs the marrow activity to keep the normal count of R. B. C. in blood by balancing the normal destruction and normal formation of red cells? It is the **Ranjaka Pitta. Ranjaka Pitta** being a **Dosha**, is the director while blood (**Rakta**) and marrow (**Majja**) being **Dhatus** are the workers. This explains why the Rishis of Ayurveda placed more importance on the liver and spleen as the organs of haemopoiesis than on the bone marrow and that is in accordance with our modern physiological conception.

Ranjaka Pitta and the Disposal of the Dead Bodies of the Red Cells

Ranjaka Pitta not only directs the formation of the red cells but also directs their disposal after death. It is believed that the red cells undergo fragmentation due to friction met with in the peripheral circulation. The poikilocyte is regarded to be the first stage before the fragmentation. These fragmented cells (called schistocytes) as well as the old unfragmented cells are ingested by phagocytic reticulo-endothelial cells in the spleen, liver and bone marrow, particularly the spleen. A large quantity of free iron, from the disintegration of haemoglobin, is thus found in the spleen and liver, mostly the spleen, as the spleen contains the largest amount of reticulo-endothelial tissue of all the organs. On account of the presence of large blood spaces or sinuses, the spleen acts as a reservoir for blood. The other functions of spleen are destruction of red blood cells and platelets, formation of antibodies, production of lymphocytes and monocytes and also myelocytes in foetus. With the destruction of blood, the hæmoglobin contained in the red cells are taken up by the cells of the reticulo-endothelial system with production of bile pigment. This takes place normally but is seen to

appear in large quantities producing jaundice when abnormally large amount of red cells are destroyed in the system. This condition takes place when the **Ranjaka Pitta** is deranged and produces jaundice, haemorrhages, eruptions, pigmentation of skin, etc., as mentioned by Charaka (Sutrasthanam, 20/13).

Jaundice—Jaundice is the yellow discoloration of the skin, conjunctiva and the tissues due to excess of bile pigments. In man, the liver, the largest and the most functionating gland of the body is mainly concerned with the excretion of bile pigment. Bile pigment is produced from the haemoglobin disintegrated from the normal destruction of red blood cells and the most important site of its production is, again, the bone marrow, the spleen coming next. The bile pigment, at this stage, (bilirubin A) circulating in the blood is of different composition to that which is found in the bile of the gall bladder (bilirubin B). The bile pigment as found in the bile from gall bladder is produced from the circulating pigment by the action of the liver cells. The chemical test elaborated by Van den Bergh distinguishes these two forms of bile pigments when present in blood. The pigment in the circulating blood gives a delayed or indirect Van den Bergh reaction, while that of the liver gives a direct reaction. Thus in a case of jaundice the Van den Bergh test indicates whether it is due to increased blood destruction or due to reabsorption of liver pigment into the circulation.

The liver thus plays a double role. It alters the circulating pigment into liver bile pigment by its own activity and performs the function of excretion of the bile pigment into bile canaliculi and ultimately into the gall bladder and then into the intestine. In any condition in which these functions are deranged, the pigment accumulates in blood in excess producing jaundice. In any case the defect in the liver is responsible for jaundice.

There are mainly 2 kinds of bile pigment, (1) bilirubin, golden yellow in colour, and being soluble stains the tissues, (2) biliverdin, green in colour, is produced from bilirubin by

absorption of oxygen. This explains why the colour of skin and tissues appears yellow or green in jaundice and very adequately noticed by the Rishis as Haritatwa (green) and Haridratwa (yellow) of the skin, conjunctiva, urine and stool in cases of disturbance of the function of **Ranjakta Pitta** (Charaka sutra, 20/13).

Conclusion

The **Ranjaka Pitta**, the seat of which is the liver and spleen is responsible for the production of blood. It may appear curious that the bone marrow, the actual seat of production of blood is not mentioned anywhere in the Ayurvedic literature. A study of this problem shows the following which confirms the above statement. (1) in the embryo, the liver and spleen are the only blood-forming organs at the beginning, handing over their charge to the bone-marrow in late intra-uterine life. (2) The recent knowledge on the Hæmopoietic principle, the seat of which is the liver, shows that the bone marrow only acts as the agent for the formation of the R. B. C. and that only when directed by the hæmopoietic principle, which may thus be rightly termed the **Ranjaka Pitta.** (3) 830,000,000 R. B. C. are formed every minute and an equal number destroyed during the same period. It is the **Ranjaka Pitta** which maintains the constant R. B. C. count by balancing their destruction and regeneration. (4) Hæmoglobin and other elements of the destroyed R. B. C. are again utilized in the formation of fresh red cells by the action of the **Ranjaka Pitta** in the spleen.

It follows, then, that **Ranjaka Pitta** being a **Dosha**, is the director controlling the formation of red cells by the bone-marrow and balancing their constant number in the circulation and also destruction and utilization of the destroyed red cells. Ayurveda recognises both the blood itself (**Rakta**) and the marrow (**Majja**) as **Dhaatus**, thus explaining why the formation of blood is ascribed to **Ranjaka Pitta** in the liver and spleen and not the bone-marrow.

Here **Ranjaka Pitta** has been described as the "Haemopoietic principle" present in the liver and formed by the interaction of the "extrinsic factor" present in the food and the "intrinsic factor" supplied by the wall of the stomach. The absence of this haemopoietic principle from liver produces pernicious anaemia and it is only in 1926 when Minot and Murphy have for the first time shown that this principle cures the disease, when administered to patients suffering from pernicious anaemia either per mouth as liver, either raw or partly cooked, or by injection of liver extract.

Summary

The functions of **Ranjaka Pitta** may now be summarised as follows—

The span of life of the red blood cells is about 3 weeks and the cremation grounds of these cells are the spleen and the liver, particularly the former where continual destruction and disintegration of the red cells take place. Microscopical examination shows the cells of the spleen containing fragments of red corpuscles in all stages of disintegration. 830,000,000 red cells are being formed every minute and an equal number destroyed during the same period.

This continual destruction of red blood corpuscles must have simultaneous continuous process of regeneration. This is undoubtedly true as the examination of blood invariably shows a constant normal count of these cells. This new formation of red cells keeps pace with the rate of their destruction in a remarkable manner, and the site of new formation is the bone marrow. Thus bone marrow is the seat of formation and the spleen and liver the seat of cremation of the red blood cells. Thus the seat of formation and the seat of destruction are quite different. But what stimulates the bone marrow to produce red cells in the same proportion as they are destroyed? The stimulus is of a chemical nature and is supplied by the liver. This knowledge has been gained very recently when it has been discovered that feeding with raw liver exerts a most beneficial

effect in severe anaemia and more recent still, when extracts of liver have been found to give the same effect. Thus liver plays a great role in the formation of red blood cells and its pigment, the haemoglobin. This function is maintained by the Ranjaka Pitta, the haemopoietic principle present in the liver.

The red blood cells are composed mainly of the pigment haemoglobin (about 90%) with some amount of the protein (about 10%). Hæmoglobin thus forms the most important constituent of the red cells and gives the red colour to the blood and being the oxygen-carrier of the body serves the most useful function for the maintenance of life. Haemoglobin exists in the form of a compound of haematin, the iron containing pigment and a protein, called globin.

Spleen and liver have thus been appropriately mentioned as the seat of blood :—

Sonithasaya Sthaanam Yakritpleehanou (Susruta—21-16)
These are not only the seat but Susruta goes further when he says that they are derived from blood in the embryo.

Garbhasya Yakritpleehanou Sonitajou. (Su. Saa. 3-4-25).

Spleen and liver well deserve this recognition but the importance of bone marrow where all the blood cells are actually produced after birth and not in the liver or spleen, has not been realised. Bone marrow as also the blood itself however have been regarded as the more important Dhaatus of our body.

This may appear curious but not actually so. According to Ayurveda, the three **Doshas** regulate all the functions of our body while the 7 **Dhatus** support and nourish the structure and functions of different parts of the body. The relation between the **Doshas** and the **Dhatus** is that the **Doshas** are the directors and the **Dhatus** the workers. The **Doshas**, again, functionate through the **Dhatus**. On the same ground **Ranjaka Pitta** as **Dosha** regulates the formation of red blood cells while the marrow as the **Dhaatu** works for it. This explains why the

liver, the seat of **Rajnaka Pitta** has been given so much importance while ignoring the bone marrow as the organ for formation of red blood cells.

Regarding the seat of **Ranjaka Pitta** all authorities agree in calling the liver and spleen as the only seat. The two Vagbhatas, on the other hand, mention that the **Aamaasaya,** the stomach is the seat. **Aamaasayaasritham pittam ranjakam rasaranjanaath—Vaa-Soo—12/10-14**—and **Aamaasayastham tu rasasya ranjanaadranjakam—Vaa-Astam—Sa—10.**

Is it the fact that the two Vagbhatas realised the existence of the intrinsic factor of erythropoiesis (described in detail under **Ranjaka Pitta**) which is undoubtedly the chief factor of the hæmopoietic principle?

Rakta Pitta

A few words regarding the production of hæmorrhage may not be out of place here. Bone marrow under the guidance of **Ranjaka Pitta**, plays another role and that in the production of blood platelets, the agents which produce coagulation of blood. Defect in the bone marrow leads to 1) defective formation of blood platelets leading to diminished coagulability of blood and proneness to hæmorrhage, (2) production of anæmia i. e, diminished quantities of red blood cells and hence of the hæmoglobin, the carrier of oxygen. The endothelial cells get less oxygen leading to their damage and liable to have hæmorrhages. A simple test can be done to know whether one is prone to get hæmorrhages as a result of injury of the capillary wall. A tourniquet is placed round the arm so as to obstruct the superficical veins but not the pulse at the wrist. When kept for a few minutes the individuals prone to hæmorrhages get hæmorrhage of varying size in the arm as a result of damage to the capillary wall. Any toxic condition e. g., infectious disease (small pox) will show hæmorrhage immediately. In **Rakta Pitta** blood comes out of the mouth, nose, ears and eyes, anus and urinary passages as well as through the skin.

Alochaka Pitta

The retina serves the purpose of vision. This function is maintained by two different layers of which it is composed. The outer layer is pigmented due to presence of large number of pigment granules in the cells, and the inner layer is again composed of seven layers, of which we are here concerned with the first layer, the layer of rods and cones. This layer is composed, as the name implies, of two kinds of cells, rods and cones, according to their shape. The rods show a pigment called the visual purple which is absent in the cones. In man the rods usually predominate largely in number, while in birds the cones are more numerous.

The outer pigmented layer is the main receptor system of the retina. The function of the pigment is to prevent the spread of the image formed on one part ef the retina to other parts. When the visual purple (Rhodopsin) in the retina has been bleached by exposure to light, there follows a gradual reformation of purple, which is independent of nerve connections. This shows definitely that the rhodopsin is the main functionating element in vision, and this undoubtedly constitutes Pitta. The two outermost layers of retina, the pigmented layer and the layer of rods thus constitute Alochaka Pitta.

The lachrymal glands, similar in structure to that of the salivary glands, situated in the upper and outer part of the orbit, secrete tears. This secretion keeps the surface of the conjunctiva, cornea and the lids moist and is constantly being evaporated. The production of this secretion takes place according to the amount of its evaporation but when in excess, it flows down the lachrymal duct into the nasal sinus increasing the fluid in the nose, and, when further in excess, runs down over the lids as tear. As these are secretary glands they might also be included under Pitta as adjunct to Alochaka Pitta.

The secretions of the lachrymal glands may be the Alochaka Pitta itself as appears from the statement of Susruta.

In the description of the eye, regarding the 4 petals or coverings of the pupil, Susruta states—

> **Tejojalaasritam baahyam taijasyam pisitaasritam,**
> **Medas truteeyam patalam aasritam twasthichaaparam,**
>
> —Soo.-U 1/18.

The outer covering is **tejojalaasritam** i. e., luminous fluid, next is of flesh, the third of fat and the fourth bone, What is actually meant by **tejojalasritam ?** The aqueous humour, the lens and the vitreous humour all being fluid in nature may appropriately be included as **Abalambaka Kapha.** What is **tejas** then ? Is it either the retina or lachrymal secretion or both.

The ciliary bodies of the eye perform a very important function in secreting the aqueous humour which occupies the chamber between the cornea and the lens. This fluid is continually being secreted and an equal amount drained away by different channels, thus maintaining the normal tension of the contents of the eyeball. If this drainage is obstructed intra-ocular tension rises leading to glaucoma and loss of vision. If there is less secretion the ciliary muscles become less tense and so leads to defective accommodation due to inability to change the convexity of the lens. The ciliary bodies, thus, play a very important role in the formation and control of the refracting media of the eye and hence of the function of the eye itself. It appears thus that **Alochaka Pitta** may also indicate the function of the ciliary bodies of the eye.

Saadhaka Pitta

This is the regulator of courage, fear, anger etc.—

Souryam, bhayam, krodham, harsham, moham, prasaadam iti.

—C.-S. 12/15.

Fear is an instinct which is born with the individual. This is true not only with man but also with lower animals. Every animal, even the microscopical one, shows evidence

of fear when an abnormal or unpleasant object is felt or approached. Fear is generally associated with flight, while it transforms into fight in cases of habitually fearless animals, *e. g.* lions.

The continued exposure of the animal to fear leads to the development of destructive passion- anger. As age advances fear and anger generally go together. Modern physiologists locate the seat of fear and anger in the supra-renal glands, the tiny ductless glands placed as a cap on the upper pole of each kidney. When this gland is cut into two, the cut surface presents two distinct zones separated more or less sharply. The outer zone is called the cortex and the inner zone the medulla. The cortex secretes substances which produce the phenomenon of anger while the medulla dominates that of fear. This has been proved on several grounds—

Anatomically—animals, e.g., rabbits which are habitually fearful have a small cortex and a wide medulla of the supra-renals, while those, e. g., lions, tigers, bulls, etc., the habitually fearless animals, possess a relatively larger cortex and smaller medulla. In human beings again, women possess a wider medulla than men.

Experimentally—when adrenalin, the internal secretion of the suprarenal medulla, is injected under the skin in proper amount, a series of events take place e. g. ,erection of hair, trembling, twitchings of the limbs, paleness, hurried breathing —all the classic manifestations of fear. This takes us to the conclusion that in fear an increased secretion of the suprarenal medulla is poured into the circulation producing these manifestations.

It appears, further, that of the two emotions, fear and anger, it is fear which appears first, occasionally followed by anger. This indicates that the stimulus originated as the cause of fear and anger first stimulates the medulla and then the cortex. This order may occasionally change giving rise to

difference in the proportion or order of the secretion of medulla and cortex. Thus we find some individuals extremely fearful and panicky with very mild stimulus, while others are not easily frightened even with great provocation and all the intermediate stages are found to occur. In wild beasts, e. g., lion, there is very often no difference in their behaviour when angry or when frightened. In both these instances they are more prone to fight than flight. Very often it is noticed that an individual although frightened at the beginning shows anger immediately following. This indicates that the secretion of cortex has become more in amount to suppress the effect of the secretion of the medulla. In these instances where anger appears first and not fear it is the primary abundant secretion of the cortex and not of the medulla. Here the cortex dominates the medulla. In women it is generally the reverse, the medulla dominating the cortex.

Courage is opposite to fear and so it is believed that this emotion is produced as a result of inhibition of the medulla. Cowardice, on the other hand, is being dominated by the sex glands, the gonads. This may mean that courage is not due to supra renal alone, the anterior pituitary and the internal secretion of the gonads also play an important role.

Berthold in 1849 first demonstrated the presence of internal secretion. The change of the human character in the eunuchs following castration was well known. Is that due to the loss of semen, the secretion of testes ? He, for the first time, removed the testes of an animal and grafted the same in another part of the same animal. He conclusively proved that although the external secretion has been cut off, still the animal retained all the characters as if there had been no castration performed. This established the existence of an internal secretion, but it was left to Brown-Sequard, Claude Bernard and Addison to place the theory on firm footing by about 1855-56.

The function of Sadhaka Pitta has all been the work of the internal secretions, from the suprarenals, gonads, thymus pineal, thyroid, pituitary, parathyroids and the pancreas. All

of these contribute to these functions by their individual or conjoined action very often complementary or antagonistic. A short summary of these functions may now be given.

The gonads—These are the glands of internal secretion present inside the male and female generative organs. The testes and ovary, apparently glands having external secretion possessing definite channels through which the vital secretions containing the reproduction cells, the spermatozoa and the ovum, come out, possess other structure, the interstitial cells, acting as the secretary cells not for reproduction but for the manufacture of an internal secretion. Through all ages, castration has been performed as to produce eunuchs to be used for various purposes. These eunuchs being deprived of the function of the gonads fail in the production of courage, valour etc., the important function of Sadhaka Pitta.

The Thymus gland, situated just over the upper portion of the heart, is found very prominently in childhood and completely disappears as the puberty is attained. It has also been found that experimental removal of the thymus hastens the development of the gonads. It thus acts as an antagonist to the sex glands.

The pineal gland, like the thymus appears in the childhood and disappears in the adult. In pathological conditions of the pineal gland, as in cases of tumour of this gland, it has been observed that sexual and mental precocity are the characteristic manifestations. A boy of five having a tumour of the pineal will look exactly like one aged 12 or 13 with even capability of true sexual life. It appears to be related with adrenal cortex in influencing skin pigment, formation of hair, brain growth and sex ripening.

Thyroid is the biggest of the glands of internal secretion and exerts a great influence on the function of skin, bone and the brain. The hairiness and moisture of the skin ; the growth and size of bone, particularly of the extremities and the skull ; and intelligence are being controlled by thyroid. The most

important peculiarity of the thyroid is the presence of a relatively high percentage of iodine and the activity of the thyroid is mainly dependent upon this iodine content.

Thyroid is the gland of production of energy and also its mobilization. During an emergency, even in normal condition any demand for increased output of energy is managed by thyroid and without that, this mobilization of energy would have been impossible.

Deficiency of thyroid produces a great handicap to the growth of the individual both in the skeleton and the mind. The result is cretinism characterised by hopeless idiocy, indifference, absence of smile and speech, dwarfism and gross disfigurement of the body due to maldevelopment of the skeleton. It becomes marvellous to find that such a cretin undergoes a complete remaking of the body and soul on being kept for a few months on the internal secretion of thyroid. This proves its great production of energy but its excess is equally dangerous. Hyperthyroidism i. e. when the secretion is in excess produces intense toxic manifestation particularly on the heart, and other vital organs. The intelligence is also regulated by the thyroid.

The PARATHYROIDS situated within the substance of the thyroid gland are 4 very small glands having some definite internal secretion possessing definite functions. Removal of these glands leads to a great increase in the excitability of the nerves, which has been estimated to be 500-1000 per cent increase of the normal. Thus the animal, the parathyroids of which are removed, will be set into convulsion if light is allowed to enter the darkened room. This has been ascribed to the loss of calcium which invariably takes place in these experimental animals. The parathyroid thus regulates the calcium metabolism of our body. Deficiency of their internal secretion leads to sudden extreme depression, nervousness, restlessnes, insomniaetc.

Table showing the effect of hyper—and hypo-secretion of the thyroid and pituitary glands on growth of body, sex and mind.

	Thyroid		Pituitary	
	Hypersecretion	Hyposecretion	Hypersecretion	Hyposecretion
Growth of Body	Soft, moist skin with luxuriant, fine, lustreful hair, Teeth well formed	Dwarfism with stunted, thick, deformed bone, Skin dry, rough with scanty brittle hair. Dentition delayed with poorly formed irregular teeth	Gigantism with large skeleton showing distortion of bones of skull, face and limbs. Face appears thickened, dry, with large thick nose, lips and tongue. Heavy growth of hair particularly over the chest and extremities. Teeth widely spaced particularly the incisors	Dwarfism with small short bones. Skin delicate with scanty hair showing distribution of opposite sex
Sex	Lowered Sexual activity	Lowered Sexual activity	Large Sex organs with loss of sexual functions in advanced condition	Small sex organs showing characters of opposite sex. Lack of sexual power
Mind	Nervous, emotional, irritable, unstable	Idiocy, indifference, imbecility	Slow and dull mental processes	Sluggish and retarded mentality
Other organs	Rapid irregular action of heart, Rapid breathing. Gastrointestinal disturbances	Slow heart action, Low blood prsssure, Constipation	Voice changes to heavy tone	Slow pulse with normal or low blood pressure, fatiguability

The supra renal glands

Apart from the role played by these glands in producing fear,anger etc. as already mentioned, they possess other very important functions. Hypersecretion of the adrenals produces increase and early development of hair showing heterosexual distribution viz. growth of beard in women. There are precocious development of sex characters, enlarged sex glands with early potency, large breasts, early menstruation etc. Mental functions are active and alert. Pulse rate increased with high blood pressure. Hyposecretion of the adrenals produces asthenia, marked pigmentation of skin particularly over the genital regions, areola of nipple etc., hair scanty, sex organs poorly developed, low blood pressure etc.

The Pituitary gland

This like the adrenal possesses two different parts, the anterior and the posterior portions, each having quite different functions. An excess of scretion of the anterior portion, leads to gigantism or giants. While thyroid influences the growth of the outer covering of the body e. g., the skin, skin glands and hair and on the preponderance of the nerves supplying the energy, the pituitary gland affects on the skeletal system and stimulates the brain cells directly, thereby acting in transformation of energy and consumption of energy. Fatigue, i e., the inability to maintain effort is mainly an evidence of insufficiency of the pituitary.

The Pancreas

It has got a great function as a secreting gland with ducts so that the secretions entering the intestines play a great role in the digestion of protein, cabohydrate and fat. In addition to this very important function it has got another equally important function which it performs by its internal secretion which is poured directly into the blood not being through any duct or channel. In this respect pancreas resembles the testes, both having a vital external secretion and equally vital internal secretion. There are millions of

islands of specialised cells, called the Islets of Langarhans, producing the internal secretion called insulin, regulating the carbohydrate metabolism, the chief ingredient for the production and maintenence of energy of our body. Disturbance of this internal secretion produces diabetes.

Conclusion

From what has been described regarding the functions of Pitta under the above groups it is clear that (1) Bhraajaka Pitta is mainly responsible for the burning sensations, rise of temperature, perspiration, maintenance of glossy appearance of the skin and protection of the skin against infective and suppurative processes. (2) Paachaka Pitta is responsible for the normal digestive functions in the processes of assimilation of the foodstuffs. (3) Ranjaka Pitta is responsible for the formation of red blood cells containing the hæmoglobin, the clouring pigment of the blood, and the carrier of the vital element oxygen to the tissues and elimination of carbon dioxide from the tissues to outside. In addition to this manifestation of blood formation normally, in abnormal conditions this is responsible for the production of jaundice, hæmorrhage and other pigmentations of the skin. (4) Aalochaka Pitta, by the pigment, visual purple also called rhodopsin, in the retina, maintains the normal function of vision. This function is due to photochemical activity of the retina which acts on the nervous mechanism of the eye to obtain the vision. The choroid body secretes the aqueous and other humours and the lachrymal glands help this action. (5) Saadhaka Pitta, the regulator of courage, fear, anger etc. performs its functions through the activity of the internal secretion of different ductless glands of our body. All these five-fold activities of Pitta are thus the result of secretion of glands either possessing ducts or ductless.

This conclusion finds a close agreement when compared with the statement of Charaka and Susruta quoted at the commencement of this study regarding the 5 Pittas.

The seat of different **Pittas** is quite evident from what has been stated above and included in the table 2. The seat of **Bhraajaka Pitta** is the sweat and sebaceous glands of the skin, of **Paachaka Pitta** stomach, of **Ranjaka Pitta** liver and spleen, of **Saadhaka Pitta** heart (blood) and of **Aalochaka Pitta** the retina and the choroid body.

It appears that **Aamaasaya** (Charaka) and **Pakvaamaasaya-madhya** (Susruta) are mentioned as the chief seat of **Pitta** This proves that **Paachaka Pitta** is regarded as the chief **Pitta** and that rightly so. Some difference of opinion exists between Charaka and Susruta regarding **Aamaasaya** and **Pakvaamaasayamadhya. Aamaasaya** is the stomach and **Pakvaa-maasaya** is the colon. **Pakvaamaasayamadhya** thus comes to mean the small intestine which includes duodenum, jejunum and ileum. The small intestine is the chief seat of digestion and so it appears more appropriate that **Pakvaa-maasayamadhya** (small intestine) is the chief seat of **Pitta**

From the passages quoted above it is found that the properties of **Pitta** are hot (**Ushna**), active (**Teekshna**), liquid (**Drava**), slightly viscid (**Anatisnigdha**), other than white and red in colour (**Suklarunavarjam**), smelling of raw meat (**Visragandha**) and bitter and sour in taste (**Rasoucha katu-kaamlau**). Further it is stated therein that the characters of **Pitta** are heat (**Daaha, ushna paaka**) excessive secretions of sebum (**Sweda, Kleda, Aamagandha**) digestion (**Katu aamla-rasa sraava**) and discolouration (other colour than red and white).

Pitta Termperment

From what has been said above regarding the properties of **Pitta** it is evident that the property of heat and excessive secretion of sebum (**Ushnatvam, Dravatvam. Visratvam**) are the results of abnormality of the **Bhraajaka Pitta.** Disturb-ance of digestion (**Teekshnatvam, amlakaturasa**) and other properties of **Pitta** lead to a change in the temperament of the individual. The following passages from Susruta describe the characters of an individual of **Pitta** temperament and the

explanation of their occurrence will be apparent when they are compared with the manifestations detailed in the above mentioned table classifying the disorders of **Pitta** under six headings. This classification read along with the explanation given by Charaka, quoted below, explains adequately the picture of a **Pitta** individual.

Pittamushnam—bhavanti cha—Chi. 8/83.

According to Charaka, due to the property of hotness **Ushnatvam** a person of **Pitta** temperament cannot bear and so does not like hot substance, his skin becomes dry and whitish, body becomes covered with pimples and moles, becomes wrinkled; he becomes more hungry and thirsty, baldness and premature grey hair takes place, his hair becomes scanty and grey. Due to the **Teekshna**, (active) property of **Pitta** the individual gets increased strength and increased digestion, thus can eat and drink in considerable quantity. They cannot bear trouble. Due to liquid **Dravatva** property of **Pitta** the individual gets loose joint and flesh and forms large amount of sweat, urine and fæces. Due to the bad smell, **Visratva** property, the individual emits a bad smell from chest, armpit, mouth, scalp, and the whole body. Due to the bitter and acid taste **Katutva** and **Amlatva** of **Pitta** he gets scanty semen and few children. Due to the combination of the above properties a **Pitta** individual becomes of middling strength, longevity, intelligence, riches and other accessories.

Further study is required to explain how **Pitta** influences the other characters of a **Pitta** individual mentioned above.

Causes of derangement of Pitta

Krodha soka bhayaayaasa upavaasa vidagdha mydhunopagamana Katvamla lavana teeshnoshna laghu vidaahi tilatyala... .. Prabhrutibhih pittam prakopam aapadyate. S. S. 21/16-24.

Pitta is deranged by abnormal anger, grief, fear, physical exertion, fasting, acid formation during digestion, sexual intercourse, partaking of too much bitter, acids, salts, pungent, hot and dry substances and substances like linseed oil and other oils, fish, mutton and other forms of meat, curd and various other articles of food and drink.

Pitta as Agni (Fire)

Agni reva sareere pittaantargatah kupito akupitah subhaal subhaani karoti. C. S. 12/15.

The fire which exists in the body as **Pitta**, being normal or abnormal, as the case might be, produces good or evil.

In Ayurveda S. S. 21/9. **Pitta** is regarded to be of similar nature as fire, nay often termed as **Agni** itself. This is due to the properties of Pitta in producing heat both inside and outside the body and also burning sensation. Again, therapeutically, weak **Pitta** can be strengthened by the use of hot substances and an aggravated **Pitta** is mitigated by cool substances. Further, according to Susruta : **Tatra 'Vaa'' gati gandhanayoriti dhaatuh. 'Tapa' Santaape. 'Slisha' aalingane.** S. S. 21/5. i. e., the words **Vaayu**, **Pitta** and **Sleshma** are derived respectively from the roots **'Vaa'** to move or excite, **'Tapa'** to heat and **'Slisha'** to embrace.

Four kinds of **Agni** are recognised in Ayurveda :—(1) **Bhutaagni**—5 in number, according to each of the **Bhutas**, (2) **Paachakaagni** or **Jatharaagni**, the digestive fire, (3) **Dhaat. vaagni**—7 in number according to each of the 7 **Dhaatus** of the body and (4) **Kaayaagni** or **Dehaagni**—the body temperature. The total number of **Agnis** in the body thus comes to be 14. Of these, the **Paachakaagni** (digestive fire) is the most important.

Panchabhootaatmake dehe aahaarah paanchabhowtikah Vipakvah panchadhaa samyak gunaan swaanabhivardhayet.
S. S. 46/546.

Our food stuffs, like our body, are composed of 5 **Bhutas** and it is the **Bhutaagnis** which digest the respective **Bhuta** parts of the food. **Jatharaagni** or **Paachakaagni** is the **Paachaka Pitta** which completes the digestion. **Dhaatvagni** is the **Agni** of the **7 Dhaatus** of our body and the first **Dhaatu**, the **Rasadhaatu**, is produced from the digested food by **Raasaagni** with the production of heat, energy etc. and also the **Kaayaagni** or **Dehaagni**, **the** body temperature. How this is done is detailed below.

Bhutaagni

Charaka says—

Bhowmaapyaagneya Vaayavyaah Panchoshmaanah Sanaabhasaah

Panchaahaaragunaan swaan swaan, paardhivaadeen pachanti hi.

Yadhaaswam swamcha pushnanti dehe dravyagunnah Prudhakh.

Paardhivyaah paardhivaaneva seshaah seshaamscha krutsnasah.

Saptati dehadhaatavo dvividhaascha punah punah,

Yadhaswamagnibhih pakam yaanti kitta prasaadatah.

C. Ch. 15/6 - 11.

That is, the five kinds of fire, those of earth, water, fire, air and ether—the five **Bhutas**, digest or consume the five kinds of food derived from the above five **Bhutas.** The food thus digested supports the body which again is composed of the five **Bhutas.** The **7 Dhaatus** or supporters of the body are digested by their own fire converting themselves into pure waste products.

Leaving aside this tremendous function of **Bhutaagni** in nature, for our present purpose let us take up the function in our body only. The action of **Bhutaagni** has been most adequately described in Mahabharata (Vanaparva) in a few words. **Dharma,** in the form of a crane, asked several dozens of questions to Judhisthira of which 4 are most significant.

These are

Kaa cha Vaartaa kimaascharyam kah panthaah kascha modate.

What is the news? What is strange? What is the way? and Who is happy? In answer to the first of these questions Judhisthira replied.

Maatur garbhe pari vartanena sooryaagnina raatri divendha nena, Asmin mahaamohamaye kataahe bhootaani kaalah acdhateeti vaartaa.

This means – Time is cooking the **Bhutas** inside this universe which serves as the receptacle with day and night as the fuel, sun as the fire and month and season as the stirring rod. This very strikingly describes how the transformation of animal, vegetable and mineral substances are taking place in nature into simpler elements and their further reconstruction into fresh material, making the cycle of life, energy and decay through the animal, vegetable and mineral kingdoms. Here the sun is the fire which not only consumes the day and night as fuel but in its turn is the source of origin not only of the day and night but also of the month and season, in fact the universe itself. We may take the **Bhutaagni** as the physical and chemical changes taking place in the food during cooking, chewing, lubricating, etc. until it is converted into **Rasadhatu**. I differentiate **Bhutagni** in our body which possesses the physical and chemical properties from **Pachakagni** present in the secretion of different digestive glands.

Paachakaa pitta—Paachakaagni

In our body **Paachakaagni** is the most important, as the life itself depends on the proper assimilation of food and the product of digestion, acted on by **Dhaatvagni**, supplies fuel to all our activities, conscious or unconscious.

Bala-maarogya maayuscha praanaaschaagnow Pratishtitaah
Annapaanedhaneayaagnih jwaiativyeti chaanyadhaa.

C. S. 17/326.

Aayur varno balam swaasthyam saahopachayo prabhaa.
Ojastejognayah praanaa choktaa dehaagni hetukaah.

Saante agnow mriyate yukte chiram jeevatyanaamayah,
Rogee syaat vikrute moolam agnistasmaanniruchyate.

Yadannam dehadhaatwojo bala varnaadi poshakam,
Tatraagnih hetu raahaaraat nahyapakwaat rasaadayah.

C. C. 15/3–5.

Dehaagni (digestive fire) is the basis of preservation of life **Aayu**, strength **Bala**, complexion **Varna**, health **Swaasthya**, energy **Utsaaha**, growth **Pushti**, lustre **Prabhaa**, vitality **Ojas**, valour **Tejas**, life **Praana** and body temperature **Dehaagni**.

When this fire is extinguished, life becomes extinct, and when it is preserved unvitiated, man lives a long healthy life and when deranged produces disease. So this **Agni** is regarded as the root of health and disease. The digestive fire is responsible for the digestion of the food which is in its turn responsible for the growth of body, **Dhaatu**, **Oja**, strength and complexion. Certainly no **Dhaatu** can originate from undigested food.

Paachaka Pitta consists of secretions from different parts of the alimentary canal having function to digest different constituents of the material taken as food. This shows that bile, the secretion from liver, is only a fraction of **Paachaka Pitta**. The digestive elements, generally enzymes or ferments in nature, are produced by the vital activity of the secreting cells of the glands and are derived from material carried by the circulating blood to the cells of the gland in a dissolved condition. The digestive secretions, **Paachaka Pitta,** are several in number, each supplementing the function of the other and it is only the action of the secretion one after the other that constitutes the complete digestive process. Defect in one link of the chain may lead to a serious consequence in the whole process of digestion.

These secretions are those from (1) the salivary glands (**Laalagrandhi**) the saliva, (2) the glands of the stomach (**Aamaasaya**) the gastric juice, (3) the pancreas (**Agnyaasaya**) the pancreatic juice, (4) the small intestine (**Grahanee vaa Pachyamaanaasaya**) the succus entericus, and (5) the liver (**Yakrut**) bile. These may now be taken separately.

The salivary secretion—The saliva is the secretion of three pairs of salivary glands, called the parotid, situated in front of the ear, the submaxillary, situated below the lower jaw and the sublingual, situated under the tongue. The nature of secretion in these three sets of salivary glands differs to a slight extent but the essential secretion is the same and that consists of albuminous substance containing the characteristic enzyme, called ptyalin. During mastication, the food material is being softened by the mucus **Kledaka kapha**, produced from the minute glands of the

mouth and salivary glands, and comes in contact with the enzyme ptyalin. The enzyme has the property to split up starch into dextrine and maltose. This action continues as long as the secretion of the medium remains alkaline. The action stops as soon as it comes in contract with acid which is present in the secretion of stomach. It may thus mean that the action of ptyalin ceases as soon as the food enters the stomach, but it is not actually so. During meal, the food enters the stomach within a few minutes, and as we shall see presently that the stomach starts to secrete the acid juice when the food enters the stomach, only that portion of the meal in contact with the wall of the stomach, the seat of the gastric secretion, becomes acid and so ptyalin ceases to act only on that portion of the meal. It takes a considerable time, say 30-40 minutes, to have the whole portion of the meal in the stomach to be thoroughly mixed up with the gastric juice and so the action of ptyalin continues for some time in the stomach, although the gastric secretion is acid. Ptyalin is destroyed by the acid gastric juice so that no further action of ptyalin ts resumed when the acid is again neutralised in the duodenum by the pancreatic secretion. As ptyalin is destroyed by acid, it is not advisable to take acid food at the beginning of the meal. The salivary secretion can be very easily collected in a glass tube outside the body. Its digestive action can then be very easily studied by adding boiled starch to the saliva, and when kept at 37°C. shows a series of changes. The boiled starch which is opalescent, thick and gives a blue colour with iodine is seen to become clear and does not set on cooling but still giving the blue colour with iodine. The starch at this stage becomes soluble starch. After some time it no longer gives the blue colour but a red colour is produced with iodine due to its conversion into dextrin. Further change takes place as it no longer gives any colour with iodine. The action of ptyalin goes upto the stage of changing the starch into dextrin and maltose and no further. The above experiment can also be done in the mouth itself. If a warm solution of starch, giving a blue colour with iodine, be kept in the mouth for one minute only and then tested with iodine, no evidence of starch will be found.

The gastric juice

The stomach **Aamaasaya** acts as a bag so that the food may remain there for a sufficiently long time. In comparison to the stomach the passage of meal through the oesophagus is too rapid so that no digestive function is possible to take place in the oesophagus. Stomach contains before meal about 30-50 c. c of fluid consisting of saliva, gastric juice, mucus etc, Gastric juice begins to pour immediately after meal and may amount to 500 c. c. or more.

The important enzymes in the gastric juice are pepsin, renin and lipase. (a) The main ingredients of gastric juice are pepsin and hydrochloric acid. Pepsin is the enzyme and acting in acid medium, it digests the protein into peptone. The digestion of protein in the stomach is thus incomplete. The further stages of converting peptone finally into amino-acids will take place in the small intestine.

(b) Curdling of milk—milk is apparently a liquid food but as soon as it enters into the stomach it curdles due to the action of rennet enzyme or renin. That curding takes place in stomach is seen very commonly in babies who during the feeding bring out curds almost as soon as it is fed. The curds thus formed are subsequently digested by pepsin along with other proteins.

(c) The fat-splitting enzyme lipase is present in small amount in stomach so that small amount of fat is split into fatty acid and glycerine. This functiou is mainly done by the pancreatic secretion in the small intestine.

The gastric juice can be collected outside the body by passing a rubber tube down the stomach after a test meal and the contents withdrawn at different periods to test the stages of digestion. In practice, the chemical examination of the gastric juice, thus obtained, gives very important facts to differentiate different affections of stomach.

Panereatic secretion—Agnirasa

Digestion in the intestine takes place by action of secretion from 3 different organs, e. g., (1) pancreas, (2) intestinal secretion and (3) bile, secreted by liver. The pancreatic

juice **Agnirasa** contains 3 important enzymes—(1) Trypsin which digests protein into peptone and still further into the final product—the aminoacids. It thus furthers the action of pepsin of the gastric juice and unlike pepsin, trypsin acts in an alkaline medium. (2) Amylase—by this enzyme starch is converted into maltose exactly in the same way as the saliva. The power of amylase in the pancreatic secretion is more than ptyalin of saliva. (3) Lipase—This enzyme acts on the fatty portion of the food and splits up the fat into fatty acid and glycerine. The alkali present in the small intestine renders the fatty acids into soaps. Bile helps a good deal in the action of lipase in the digestion of fat.

The Intestinal Juice

The intestinal juice or succus entericus, as it is called, is secreted from the large number of glands present in the wall of the small intestine **Grahani** or **Pachyamaanasaya** and contains powerful enzymes—(1) enterokinase. This increases the function of trypsin of the pancreatic juice in digesting proteins. The mixture of pancreatic and intestinal secretion leads to the digestion of all proteins into the final product aminoacids. (2) Invertase, maltose and lactase. These are eezymes which break down the carbohydrate elements into the final product glucose, ready to be absorbed into the system.

Bile (Pitta, yakritrase)

Bile itself has very little digestive action as it contains no enzyme but through the bile salts, it helps the function of pancreatic secretion to digest and emulsify fat and also the absorption of fat. Bile stimulates the production of pancreatic secretion. The function of bile in fat digestion is observed in cases of obstruction of the bile duct when no bile flows into the intestines, a large amount of fat remains undigested and passes out with the feces giving it the clay coloured appearance.

The large intestine

This mainly serves the purpose of excretion.

The Mechanism of digestioa.

We have seen that **Pachaka Pitta**, the secretions of different glands of the alimentary tract, contains different enzymes, each having some particular function on some definite proximate principle of our food. When the food comes in contact with these enzymes present in the different digestive juices, the different constituents of food are digested into the final products so that they may be absorbed to form the Rasadhatu.

A very important partinent question may arises. Are all the secretions,—salivary, gastric, pancreatic, bile and intestinal —liberated simultaneously as soon as food is taken? The answer is very interesting. All the secretions are not liberated simultaneously. Every secretion follows a definite sequence and that in a perfectly regular order, one following the other and that only as the result of the previous step. The presence of food in the mouth or the smell, or even the thought ofca meal leads to the production of saliva. We have already studied that ptyalin of the saliva digests starch into dextrine and maltose. Only when this dextrine along with food enters the stomach the gastric secretion is excited. Further only when the gastric juice along with fat in the food eaters the duodenum, bile pours dowu in the intestine which leads to absorption of secretion from the duodenal wall. The flow of pancreatic juice takes place only when the secretion from the duudenal wall reaches the pancreas through blood stream after absorption. The trypsin of the pancreatic secretion only becomes active when it comes in contact with enterokinase of the intestinal secretion. The secretions are thus dependent one on the preceding one, thus maintaining the different stages of digestion of different elements of food-the protein, carbohydrate and fat.

The mechanism of digestion is a very complicated process as can be seen from what is just mentioned. It becomes further complicated from the point of view of the fact

that there exist at least 3 sphincters which normally remain closed and open only when some definite stimulas is acting. Thus the food reaches the first sphincter at the junction of the stomach and duodenum, the pyloric sphincter. This opens only when strong movements of the stomach bring the food to this end. When a small quantity of food comes to this region the pyloric end is relaxed and the orifice opens allowing a small quantity of the meal to enter the duodenum after which the orifice closes immediately only to open again when the next wave of contraction reaches there. This takes place regularly at intervals of 15-20 seconds until the stomach is empty. The next sphincter occurs at the junction of the small intestine and the large intestine, the ilio-caecal valve. The last sphincter is situated at the anus.

Dhatvagni

Every cell of animal body contains an enzyme which takes part in nutritional processes and thus maintains the metabolism of the cell. This enzyme, in Ayurved, is called **Dhatvagni**, the **Agni** of the Seven **Dhatus** of our body. Blood and lymph bring the **Rassdhatu** to every cell but what makes the bone to retain only the calcium and phosphorus from it, the muscle, only the proteins peculiar to the muscle, the subcutaneous tissue only the fatty material? This selective action is maintained by the special selective function of the respective **Dhatvagni**.

Dhatvagni is of 7 kinds, one for each of the 7 **Dhatus** of our body. Here we are concerned with only one **Dhatvagni**, the **Rasagni**. that is the **Agni** which regulates the utilization of the first **Dhatu**, the **Resa-dhatu**. **Bhutagni** and particularly the **Pachakagni** produce the **Rasa-dhatu** from the food which goes via the portal vein into the liver and then into the general circulation, the fatty portion passing through the thoracic duct into the circulation direct. This **Rasadhatu** is the fuel for the production of heat, energy, etc. and **Rasagni** is the fire which activates this transformation. The existence of this **Rasagni** can be very easily understood. We shall see presently that glucose, in the tissue as one of the ingredients of **Rasadhatu**, when acted on by oxygen carried to the tissue

by blood, produces carbon-dioxide and water. and as a result of their reaction good amount of heat and energy is liberated. But what makes this reaction? It is the **Rasagni** persent in cells. If oxygen from the oxygen cylinder is passed through a solution of glucose for any length of time no carbon dioxide, water nor any heat or energy will be liberated. It is the particular animal heat, the **Rasagni**— the cellular enzyme of the body' which supplies the fire to burn the fuel glucose inside the tissues with the aid of oxygen. Thus **Rasagni**, the first **Dhatvagni** utilizes the fuel, the **Rasadhatu**, in the production of heat, energy, etc. and also of blood, the next **Dhatu**. How this is done is detailed below.

The animal body acts like a heat engine in which combustible material or fuel is taken in as food which is oxidised in the body, the engine, with: production of energy available either as work by the muscles or as heat. Every work, mental or physical, particularly that of the muscle requires some fuel to be oxidised. This fuel is supplied by the carbohydrate and fats circulating in the blood as products of digestion. In starvation, these are obtained from the body itself. In conditions where there is no apparent muscular activity, e. g. in sleep, the body requires fuel for the maintenance of circulation, respiration, movements of intestines and for other muscular and glandular activites. A huge amount of fuel is further required for the maintenance of the normal body temperature which is constantly being lost by radiation, conduction, and by evaporation of insensible sweat. The minimum amount of heat produced by the body to maintain the living condition of the individual at complete muscular and mental rest is generally termed the basal metabolism. Attempts have been made to express these three different forms of energy i. e. the body heat, the fuel value of foods and the energy required for muscular work, in terms of some unit, so that interrelationship of these three apparently widely different conditions may at once be correlated. It has become customary to express this unit in terms of calories. A calorie is defined as that amount of heat required to raise the temperature of one kilogram (1000 c. c. or one Seer) of water $1^{\circ}C$, i. e. from $15^{\circ}C$ to $16^{\circ}C$

or that amount of energy required to raise a kilogram of weight to a height of 1 meter (39.37 inches, a little more than 1 yard). It has been estimated that the basal metabolism of a normal individual, which is always constant, varies between 1600 to 1700 calories per 24 hours or about 20 calories per kilogram of body weight. This amount of calories is required to maintain circulation, respiration etc. as during sleep. With work this rate is considerably increased. A man sitting still will require 100 calories per hour; with slight work, 300 calories, with maximum work about 600 calories and an athlete engaged in hard muscular work e. g., in rowing or foot ball match for one hour will expend energy equivalent to about 1700 calories, i. e., the basic metabolic rate for a period of 24 hours. It has further been estimated that due to the above reason, a clerk requires only 2800 calories per day, while a factory labourer will require 4200 calories per day.

This caloric requirement is always supplied by the food.

Liver, the biggest chemical factory of our body, plays the most important role in metabolism. All carbohydrates taken with food are absorbed in the form of glucose and that part of glucose which is not required for immediate body requirements are stored up by the liver as glycogen to be released again when required by the body. It thus acts as the biggest store-house of energy. All the protein constituents of our food after digestion are taken in as amino-acids. Here again, the liver takes up the amino-acids not immediately required by the body. The amide portion of the amino-acids is converted by liver into urea to be excreted by the kidney while the remaining portion is converted into glucose. During starvation, after the whole amount of stored up glycogen and fat is exhausted, break-down of body protein takes place ultimately into amino-acids. Liver utilises the amino-acid, thus produced, in converting it into glucose and urea, the glucose serving the purpose of supplying the basal metabolism required by the individual during fasting. The storage of unused fat takes place in the big store-house under the skin and in the deeper structures all over the body.

All these functions are being done by **Pitta** adequately called Dhatvagni.

The energy of the body is entirely derived from the combustion of the final product of the foodstuffs by the process of oxidation of the component elements. Each material derived from absorption of the digestion of food gives out some definite and constant amount of calorie by the process of oxidation. The process of oxidation gives rise to (a) energy in the from of calorie, (b) water, called water of oxidation, and (c) carbon dioxide. These are produced in the tissues by the combustion of foodstuffs, Rasagni suppling the fire.

It thus appears that while carbohydrate and fat are completely oxidised in the body, protein oxidation is never complete.

A few words may be said here by way of explanation of the tissue energy, calorie etc.

The matter obtained from the plant or animal is taken into the body and digested into the elementary products of plotein, carbohydrate and fat. These unite with the oxygen liberated by the plant into the atmosphere and carried to the tissue by inspiratory processes through the arterial blood. The final product of carbohydrate is glucose. This circulates in the **Rasadhatu.** One grain of glucose consumes 1.067 grms. of oxygen carried by the hæmoglobin of the blood, thus making up a total quantity of 2.067 grms. This is shown by the formula

$$C_6H_{12}O6 + 6O_2 = 6CO_2 + 6H_2O$$

(glucose) (oxygen) (carbon dioxide) (water)

Thus 1 grm. glucose + 1·067 grm. oxygen i. e. total 2·067 grm. after complete combustion produce 1·467 grm. carbon dioxide and 0·600 grm. water (total 2·067 grm.) The energy liberated by this process of combustion is equivalent to 0·3 calories which again, is utilised in the production of heat and muscle power.

This union with oxygen, or oxidation as it is called, converts the elementary substances of digestion of carbohy

drate, fat and protein into carbon dioxide (CO_2) and water and liberating energy as the result of this action to be utilised by the muscles as power. This CO_2 is again taken up by the plant to absorb the carbon and to liberate oxygen (O_2) in order to run the same cycle. The fæcal matter of the individual containing minerals enriches the soil to be utilised by the plant for its growth. The same story is repeated during the process of cooking. The carbon from the plant aided by the oxygen of the atmosphere produces heat, carbon dioxide and ash. The carbondioxide and ash are being utilised by the plant to rebuild carbon. The two processes of the circulation of matter and power illustrate how the energy is being utilised as mechanical power of the muscle on the one hand and production of heat on the other.§

Kayagni or Dehagni

This **Agni** supplies the body temperature. This oxidation of the foodstuffs produces energy which is required for two purposes, (1) performance of mechanical work by the muscles. All our activities particularly the work of heart, muscles of respiration and muscles of the limbs etc. get this energy as a product of oxidation of the fats and carbohydrates and (2) production of heat. This is the mechanism of production of all heat of our body and thus the site of heat production is the organs and tissues where the oxidation and combustion of the food material or its products are the most. The liver and the muscles are thus ths main seats of heat production.

The heat produced by the metabolism of the products of fats, carbohydrate and protein supplied by the food **Rasadhatu** is usually spent by 5 different ways, of which the first four are used both at rest and work and the last one during work.

These are—(1) **Radiation**, evaporation at the surface of the skin, (2) evaporation in the lungs, (3) warming the air

§ The quantity of heat required for the digestion of food consumed by an average human being is equal to that which is required to bring one pot of 4 gallons of water to the boiling point. A. L.

in respiration, (4) warming the water and other foodstuffs in the stomach and (5) energy required during work. when the supply and expenditure are not balanced, particularly when there is shortage of income, there comes the necessity of more supply in the form of food, otherwise consumption of stored fat or protein of the body will take place as in starvation. When the income exceeds the expenditure, the potential energy is stored in the form of fats, and in the young in the form of muscles too. This usually takes place in the young as the income is always in excess of the expenditure and so the child gains in weight. When he attains the adult life the balance is maintained. Occasionally we find that certain individuals show a tendency to be fat or lean irrespective of the income in the form of foodstuffs or expenditure in the form of work. This is generally due to the disturbance of the mechanism of metabolism as a result of changes in the glands supplying the internal secretion.

Maintenance of Constant body Temperature

Animals belong to two groups. Those possessing a constant temperature are called the warm-blooded animals e. g. mammals and birds, while those having the temperature variable according to that of the surrounding medium are called the cold-blooded ones.

In man, temperature varies in different parts of the body. The surface temperature invariably shows a lower temperature than deeper organs. Further, the organ in which chemical changes are more active, e. g. the liver, shows a higher temperature than the general circulation.

Human body temperature is the balance or difference between the heat production and heat loss. The rise of body temperature may take place in either of two ways, viz.—(1) by increased production of heat and (2) by diminished loss of heat. Heat production takes place in the liver and muscles by the oxidation process of the assimilated products of foodstuffs from the blood. Heat loss takes place mainly through the skin and partly through the lungs. The variation of the temperature of the skin is affected by peripheral vasoconstriction and dilatation and is maintained by radiation, amounting

to 60% of total heat loss, conduction or convection amounting to 15% heat loss and by secretion and evaporation of sweat, producing 25% of heat loss. The regulation of the loss of heat depends to a considerable extent on the general atmospheric condition. Moist air, being a better conductor than dry air, leads to more loss of heat by radiation and conduction but the evaporation of the sweat from the surface of the body is not increased. For this reason in a cold moist day one feels more cold than on a day even when the temperature is much lower. Similarly hot moist air causes more discomfort than hot dry atmosphere. In cases of hot moist air with increased heat production due to physical exercise along with very low heat loss, the internal temperature is elevated and condition of heat stroke is produced. This is furthur favoured in persons possessing a defective vasomotor system. Sunstroke is quite a different affection and results from exposure to the direct rays of the sun, especially over the head.

It is not the increased production of heat which causes fever, but the main factor responsible for its production is the retention of excessive amount of heat. The heat regulating mechanism is kept at a higher pitch and allows the escape of heat only at a higher level.

Sensation of Temperature, burning Sensation Etc.

These sensations have nothing to do with the actual rise of the body temperature. These are dependent on two factors (1) amount of blood in the skin. The more the vessels are dilated the more the feeling of warmth e. g., in emotions and after drinking alcohol, where there may be a fall of body temperature or during malarial attack the body temperature may be 104 F. still there may be shivering and feeling of chill. (2) The temperature of the nerve endings of the skin. This appears to be the main factor for the burning sensation as found in cases of derangement of Pitta. The mechanism is mainly dependent on abnormality of the secretion of sweat. This is now explained in detail.

Under normal condition the internal temperature, which is greater than that of the surface, is carried constantly by the blood to the surface. Had there been no radiation, conduction

or convection the surface temperature should be the same as that of internal organs. The sweat glands secrete the sweat normally, the latent heat obtained from the body as the result of evaporation of the sweat, reduces the surface temperature. The normal surface temperature produced thereby acting on the nerve endings of the skin gives the normal sense of temperature. Increased evaporation of sweat makes the surface colder and sensation of cold is perceived. When evapora tion is less with or without increased sweat, as in moist heat of Bengal, sensation of warmth or burning sensation is felt and greater discomfort takes place than when the air is hot and dry. The rapidity of the flow af air over the surface plays the same role. A draught under a fan increases the evaporation of sweat, giving the sensation of coolness while stagnant air gives the sensation of burning, the temperature of external air remaining same.

From the description of the mechanism of heat loss, regulation of body temperature and the feeling of burning sensation etc., it is evident that all these are chiefly being regulated by the activity or otherwise of the sweat glands. It appears thus that sweat glands are responsible for burning sensation etc.

Further, the sweat glands mostly occur on the forehead and the palms and soles of man and so the greatest amount of perspiration takes place in these sites and in abnormal condition burning sensation is perceived mostly in these regions. Palms and soles are very rich in sweat glands only because there is no hair there. The more the hair over the human skin the lesser number of the sweat glands are present.

It has been estimated that there are about 3500 sweat glands and ducts in every cubic inch of the human body surface. The sweat duct is about a quarter of an inch long thus forming a pipeline of about 30 miles in length, if all the ducts of the skin are joined together. Through this pipe line passes about 203 lbs. of water daily as insensible perspiration.

The maintenance or disturbance of the constant body temperature thus depends on several factors related to heat production and heat loss. These may be summarised in a tabular form.

Heat Production	Heat Loss
1 Action of food.	1 Sweating or panting.
2 Exercise or shivering.	2 Increased circulation of skin.
3 Unconscious increased tension of muscle	3 Vapourisation of increased insensible perspiration.
4 Increased basal metabolic rate.	4 Cooler environment Increased air movement. Decreased in cloathing.
5 Disease.	5 Increased radiating surface.

Chapter XV

Kapha

* It is the third of the three **doshas** and it constitutes the preservative principle of the body. **Prithivee** and **Ap bhutaas** enter into its structure. It is present in two forms, one a subtle state and the other, a tangible and manifest form. The general build, stability, strength and stamina of the system are dependent on it. It promotes mucilaginous secretions for the preservation of the tissues from the over-action of **Pitta** which is "**ushnam**" and from that of **Vaata**, which is "**ruksham**". It is the cooling, sustaining and preserving constituent of the system.

(Astanga Sangraha—Sutra. Chap. 20; Charaka—Sutra. Chap. 12. Verse 12; Susruta. Sutra. Chap. 15. V. 4).

The fundamental properties (gunaas) **of Kapha are**—(1) Unctuosity (**Snigdham**), (2) Coldness (**Sitam**), (3) Heaviness (**Guru**), (4) Dullness (**Mandam**), (5) Smoothness or frictionlessness (**Slakshnam**), (6) Sliminess (**Mritsnam**) (7) Firmness (**Sthiram**), (8) Whiteness (**Swaityam**) and (9) Sweetness (**Maadhuryam**).

(Astangahridaya, Chap. I. V. 12; Charaka. Vimana. Chap. 8—line 14—[7-5]; Susruta. Sutra. Chap. 21-V-15).

The normal functions of Kapha are as follows:—Oily smoothness, smooth working of joints, general stability of the body, general build, potency, strength, forbearance, courage and greedlessness.

(Charaka Sutra. Chap. 17. V.115; Charaka. Sutra. Chap. 12 V-12; Susruta Sutra. Chap. 15 V-4. Astanga. Samgraha. Sutra. Chap. 19).

Symptoms and signs of an increase of Kapha in the body. Weakness of the digestive fire, dullness, haviness, laziness, chilliness, salivation, pallor, looseness of the various structures of the body, cough, dyspnoea, and excessive sleep.

(Susruta Sutra. Chap. 15, V; 15; Astanga Samgraha—Sutra. Chap. 19; Astanga hridaya—Sutra. Chap. 11 V. 16-17)

Manifestations due to a decrease of Kapha in the system:—Dryness, giddiness, internal burning sensation,

* Extracted from the Fundamental Principles of Ayurvedic Medicine, Bulletin by Government School of Indian medicine.

thirst, a felling of emptiness in the varions seats of Kapha (as the stomach, chest, throat, head and the joints), palpitation (**hriddravam**), losseness of joints, weakness and insomnia.

(Charaka Sutra, Chap. 20 ; V. 11-12 ; Astangahridaya—Sutra ; Chap. 12 V. 49-50.)

Excited or abnormal Kapha Produces the following features:—Oiliness, hardness, coldness, heaviness, dullness, sense of fullness; laziness, pruritus, excessive sleep, impaired digestion, oedema, slowness of action and resolution, pallor, immobility of parts, numbness, exudations, a sensation of tightness or of being plastered over, white colour and sweet and saline taste.

(Charaka, Sutra, Chap. 20, V-9).

Although Charaka and others have stated that the principal seat of kapha is URAS (Chest), Susruta says that the generating station of kapha is Aamasaya. (Susruta Sutra. Chap. 21-V. 12-14.)

(See also—Astanga Sangraha Sutra. Ch. 20).

Kapha sthaanaas or seats of **Kapha** in the body.– Though **Kapha** pervades the whole body, its special seats are: **Chest,** neck, throat, head, **Kloma** (trachea?), the joints. **aamaasayam** (stomach), **rasadhaatu, medas,** nasal organs and the tongue.

The five divisions of Kapha are—

(1) **Avalambaka** located in the chest, supports the **trikam** (junction of the sacrum and the iliac bones) by its inherent powers, and the heart with the help of the nutrtion derived from food; it helps the other seats of **Kapha** by supplying moisture and other watery elements to them.

(2) **Kledakam** is situated in the **aamaasayam** (stomach), converts the solid food into one of a liquid consistency by supplying moisture.

(3) **Bodhakam** : has its seat in the tongue and is concerned with the perception of taste.

(4) **Tarpakam** : resides in the head, and nourishes and refreshes the **Indriyaas.**

(5) **Sleshakam** : stationed in the joints, serves to bind the structures together and keeps them intact.

(Susruta Sutra. Chap. 21-V. 12-14); Astanga Hridaya Sutra. Chap. 12 V. 15, 17; Astanga Sangraha. Sutra. Chap. 20; Sarangdhara, Purva. Chap. 51).

Factors that aggravate or excite Kapha in the body:— Day-sleep, sedentary habits; partaking of foods that are heavy, slimy, sweet, sour and saline, foods and articles which are incompatable and which increase the mucoid secretions of the system, eating of food before the previous meal is digested, cold articles of diet, things that are viscid and block the body-ducts, the use of food-grains and pulses as **Haayanaka, Yavaka Naisadha, Utkata, Maasa, Mahaamaasa, Godhuma, Tila,** various flour preparations; curd, milk, **Krisaraa· Paayasa,** and various preparations of cane-sugar; the flesh of beasts and birds which are aquatic in their habits or live in swampy lands; **Vasu,** bulbs and lotus stems, **Kaseruka, Sringaataka, Madhura-Phala, Valliphala**; excess of **brimhanam** (nutritive and growthpromoting treatment.)

Kapha naturally undergoes aggravation in the forepart of the morning and night, soon after a meal, in the cold season, in the **Vasantaritu** especially, in the early period of a man's lifetime and by the use of cold foods and drinks.

(Susruta, Sutra. Chap. 21-V. 19-24;

Astangahridaya Nidan. Chap. I-V. 21-22.)

Gurumadhurarasatisnigdha dughekshubhakshya-drava-dadhi-dinanidrapupasarpih prapuraih, Tuhinapatanakale Sleshmanah Samprakopah Prabhavati divasadou bhuktamatre vasante—Thri Sathaacharya—(Extracted from Vijaya Rakshita's commentary of Maadha- vanidaanam.)

The following factors and seasons are contributory to the chayam, prakopam and prasamanam of Kapha:

	Chaya	Prakopa	Prasamana
Causative factors	Combination o **Kapha gunas** as **Snigdha, Guru**, etc., with **Sitam** (cold).	Combination of the same **gunas** with **Usnam** (heat)	Combination of **gunas** as **Ruksham, laghu**, etc., with **Ushnam** (heat)
Seasons of the year	**Sisira ritu**	**Vasanta ritu**	**Grismaritu**

According to the diet and practices of persons **Kapha** may attain **chayam**, etc., in seasons other than those mentioned above or may not, even in their due seasons.

(Charaka Sutra, Chap. 17 V-112. Susruta Sutra Chap. 6 V. 14. Astangahridayam, Sutra, Chap. 12, V. 27 and 24.)

The diseases and disorders due primarily or chiefly to Kapha are the following :—

1	**Tripti**	...	Sensation got after a full meal without having eaten anything
2	**Tandra**	...	Laziness.
3	**Nidradhikyam**	...	Excessive sleep.
4	**Staimityam**	...	Immobility or rigidity.
5	**Gurugatrata**	...	Heaviness of the limbs.
6	**Alasyam**	...	Disinclination for all kinds of exertion.
7	**Mukhamadhuryam**	...	Sweet taste in the mouth.
8	**Mukhasrava**	...	Salivation.
9	**Slesmodgiranam**	...	Expectoration of phlegm.
10	**Malasyadhikyam**	...	Excessive formation of **mala.**
11	**Kanthopalepa**	...	A sensation as if the throat covered over with a coating of phlegm.
12	**Balasa**	...	Loss of strength
13	**Hridayopalepa**	...	Sensation as if the heart or the cardiac region is covered over with a coating of phlegm.
14	**Dhamanipratichaya**	..	Fullness of the **Dhamani** vessels
15	**Galaganda**	...	Enlargement of the glands of the neck.
16	**Atisthoulyam**	...	Excessive obesity.
17	**Sitagnita**	...	Weakness of the digestive fire.
18	**Udarda**	...	Urticaria and angioneurotic œdema.
19	**Swetavabhasata**	...	Paleness of complexion.
20	**Sweta mutra netra varchastwam**	..	Pale colour of urine, eyes and fæces.

(Charaka Sutra. Chap. 20-V. 20 ; Astanga Samgraha Sutra Chap, 20.)

Measures and methods of alleviating abnormal Kapha.—Strong emetics and purgatives, foods and other articles which

are dry, small in quantity, keen, hot and possessing pungent, bitter and astringent tastes, drinking of very old wines and honey, sexual enjoyment, night waking, all kinds of exercise, dry massage, diaphoretic measures (**Swedana**), errhines (**Siro-virechana**), and infliction of cares and worries.

The following are especially useful for the alleviation of Kapha :—

Emetics, **Yusham** (special soups), honey, medicines which reduce fat, various kinds of smoking, various degrees of starvation, gargles, avoidance of pleasures; and measures which make an individual unhappy.

Emetics are the special means by which the vitiated **Kapha** is expelled from the body, since **Aamasayam** is the main seat of this **dosha.**

(Charaka Vimaana. Chap. 6—V. 15-18; Astanga Samgraha-Sutra—Chap 21; Astaangahridaya-Sutra. Chap. 13. V. 10-12.)

† FIVE KINDS OF KAPHA

For the purpose of the study of **Kapha** the following materials are available from the **Samhitas**.

Charaka Samhita—Sutrasthaanam—12/12, 16; 18/40, 44: 20/18.

Susruta Samhita—Sutrasthaanam—15/4, 15; 2/12-14.

Instead of quoting all these passages, it will suffice to mention only one– C. S. 20/18 which indicates the 20 symptoms of abnormality of **Kapha** which are as follows- 1. Satiety after food. 2. sleepiness. 3. increased sleep, 4. moist condition of the body, 5. feeling of heaviness of the body, 6. laziness, 7. sweet taste in the mouth, 8. increased fluid in the mouth, 9. bringing out phlegm, 10. excess of excreta, 11. lethargy, 12 feeling of pressure over the chest, 13. sticky mucus in throat, 14. fullness of vessels, 15. swelling in the front of the neck, 16. general anasarca, 17. indigestion, 18. local oedema, elephantiasis, 19. pale complexion of the whole body, 20. pale colour of the urine, faeces aud eyes.

† The following extracts are taken from the valuable article Contributed by Dr. D. N. Benerjee. M.B. Cat.), M. D (Berlin), to the Journal of the Indian medical associtíon Vol. XII No. 4, Jan. 43.)

The passage of Charaka Samhita – C. S. 12/16 gives us a nice clue to classify all the materials referred to above. The heading of this classification is indicated thus-

1. **Sthoulyam, Kaarsyam** (general or local fullness, or œdematous condition of the body or the reverse). 2. **Utsaaha and Aalasya: Vrishata and Kleebata; Jnaana and Ajnaana; Vriddhi and Moha** physical and mental fitness or the reverse). 3. **Kledana,** (lubricating qualities). 4. **Rasam or Bodham** (qualities to ascertain the taste). 5. **Daardhayam and Saidhilyam** (uniting or disuniting the different elements of the body giving it the firmness or relaxation), and 6. **Snehana and Tarpana** (cooling qualities).

Thus the 20 symptoms enumerated above can be classified accordingly in the following way- The symptoms numbered 4, 5, 14, 15, 16, 18, 19 and 20 may be grouped under the first heading, symptoms numbered 2, 3, 6, and 11 under the second, numbers 1, 9, 10, 12, 13 and 17 under the third; numbers 7 and 8 under the fourth. The fifth and sixth headings are not represented here. This shows that all the manifestations of normal and abnormal **Kapha** can be very appropriately classified under the above six heads. When the first two heads are taken together in makes five groups and these exactly fit in with the description of the qualities attributed to each of the five **Kaphas, viz** 1, **Avalambaka kapha** (lit. which supports). This regulates general or local fullness or cedematous conditions of the body or the reverse and the physical and mental fitness or the reverse. 2 **Kledaka kapha** (lit. that which moistens). This regulates the lubricating qualities in the body. 3. **Rasaka** or **Bodhaka Kapha** [lit that which causes perception). This regulates the qualities to ascertain the taste. 4. **Shleshaka Kapha** (lit. that which joins). This regulates uniting or disuniting the different elements of the body giving the firmness or relaxation. 5. **Tarpaka Kapha** (lit. that which satisfies). This regulates the cooling qualities in our body.

Avalambaka ıkapha

The physiology of regulation of these functions may uow be stated very briefly. 1 **Avalambaka Kapha** represents the body water of our body which pervades through every part, between and inside every cell, inside and outside every channel.

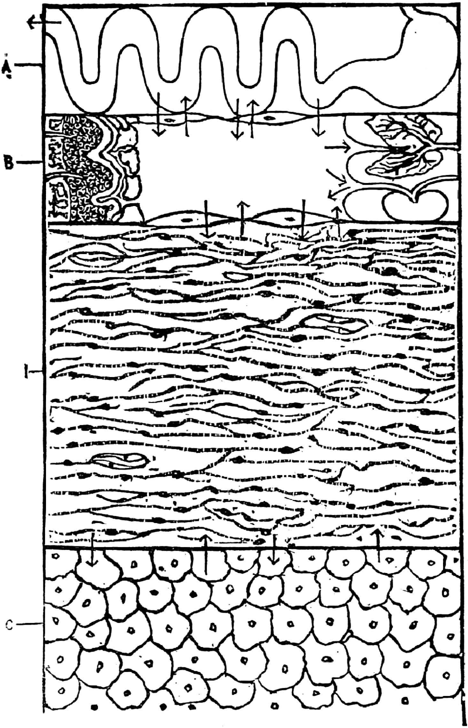

Figure Showing the distribution of water in our body.

The figure shows four compartments marked A, B, I and C.

A—represents the alimentary canal, the source of intake of all fluids in our body constituting 70% of the total human body weight. The arrows show the entry of fluid into the stomach, partly leaving the body through the anus and the rest absorbed into the second compartment B, representing blood. In normal conditions and particularly in vomiting and diarrhœa, water enters into the alimentary tract from blood.

B--representing the blood fluid comprising 5% of total body weight receives its water from the alimentary tract (A) and the interstitial fluid (1) and drains away water through the skin shown to the left and through the lungs and the kidneys shown to the right of the figure. Some water is reabsorbed from the tubules back into the blood.

I—represents the interstitial fluid comprising 15% of body weight which interchanges fluid intake and output with the blood on the one hand and the intracellular fluid (C) on the other.

C—represents the intracellular fluid comprising 50% of total body weight which interchanges fluid with the interstitial fluid only.

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of our body and constitutes about 70% of our body weight. This water called "Body water" exists in our body in 3 compartments (1) Watery portion of blood (5% of body weight), (2) interstitial fluid (15% of body weight), and (3) intracellular fluid (50% of body weight). How this water interchange takes place from the alimentary tract, its chief source, to and from the 3 above named compartments, is shown in the figure above. It is to be noted that even in extreme case of loss of fluid *e.g* in cholera, the whole amount of blood water cannot be lost as certain amount must be there to hold the blood protein in solution. Similarly a considerable amount of intracellular fluid must remain inside the cells. This portion of water which must remain in blood and cells is known as "bound water." Constant change takes place in the interstitial fluid to keep the water balance of our body intact. An excess of this fluid constitutes œdema. The cells of our body are separate and individual units; so they require some binding or supporting material to put them in groups and to have conjoint

function. Further, this function can only be carried out when there is free flow of the ingredients from within the cell outside and the reverse and that is possible when these ingredients are in solution. The body water performs this double function by supporting the cellular elements (**avalambaka**) and helping in the functions of the cells as a vehicle in supplying the requirements and removing the effete materials. It is thus quite obvious that in abnormal conditions of this **kapha**, general and/or local fullness or œdematous condition of the body or the reverse might take place. Body fat also supports **Avalambaka Kapha** as it also supports some of our tissues but it cannot be the **avalambaka kapha** itself as it is included as **Medo Dhatu**, one of the **Dhatus** of our body. All **Dhatus** support the body, as the derivative meaning of the word—**Dhatu** is to support.

The other function of the **Avalambaka Kapha** is to maintain physical or mental fitness or the reverse. This may be explained thus. Body water is derived from three different sources. (*a*) from the amount of water we drink, (*b*) derived from the water contained in our foodstuffs, as water amounts to more than 80% of the total weight of the food stuffs taken and (*c*) the water of oxidation. We are concerned with the water of oxidation here. We have already seen during the study of **Pitta** as **Agni** (fire) that the carbohydrates (glucose) during oxidation produce carbon dioxide and water as per formula $C_6H_{12}O_6+6(O_2)=6(CO_2)+6(H_2O)$ and as a result of this reaction energy or heat is produced. The water thus obtained – the water of oxidation – which is fairly considerable in amount produced as the result of oxidation of the products of digestion mainly the carbohydrates and fats is responsible for the maintenance of physical and mental fitness. When this water of oxidation produced in the tissues, accumulates locally at the site of origin, it increases the local body water as in cases of sleep during the daytime, lack of exercise, sedentary habits, partaking of too much sweets, etc. (the very causes of the production of abnormal **Kapha** according to **Ayurveda**, (S. S 21/23-24). This local accumulation produces a feeling of heaviness of the body, sleepiness, laziness, lethargy, increased sleep, etc.

The **Avalambaka Kapha** has still another function *i. e.*, **Ropanakrit** (S. S. 15/5) favouring the implantations of furuncles. This takes place because of the loose cellular tissue and so bacteria may have free entrance and produce the damages as the soil is ready and as no tissue response is possible due to the separation of tissue spaces. The body water thus represents the **Avalambaka Kapha.**

2 Kledaka Kapha

The **Kledaka Kapha** represents the mucus derived from mucous membranes of our body which moistens and lubricates —(*a*) the respiratory passages for easy respiration, (*b*) the foodstuffs to be digested, (*c*) the faecal matter for easy expulsion. Thus we find in **Ayurveda**, abnormal **kapha** leads to vomiting of phlegm, sense of fullness of the stomach, anorexia, excess of excreta, sticky mucus in throat, feeling of pressure in the chest due to scanty or dried up mucus.

3 Bodhaka Kapha

The **Rasaka** or **Bodhaka Kapha** has got the quality to ascertain the taste. This is the fluid which keeps the tongue moist and clear, which is the sign of health. Abnormality leads to dry tongue which is of bad prognosis. It is this moisture which is essential to the recognition of the different tastes. The actual recognition takes place by the taste-buds, the nervous structure representing **Vayu**. The fluid, moistening the tongue and helping to recognise the taste, is the **Rasaka** or **Bodhaka Kapha.**

4 Sleshaka Kapha

The **Shleshaka Kapha** unites the different elements of the body. From the description as found in the **Samhitas** it may appear first that its function is to unite one bone with the other at the joint, thus identifying itself as the synovial fluid. On closer study, however, it reveals that the **Shleshaka Kapha** unites not only one bone to another but also muscle or tendon to bone, one band of muscle to another, the skin with the subcutaneous tissue, etc., giving the compactness of the tissue.

It appears thus, that while **Shleshaka Kapha** unites coarse with coarse structures, the **Avalambaka Kapha**, the body fluid, unites the finer and microscopical structures.

5 Tarpaka Kapha

The **Tarpaka Kapha** cools the brain and the eye. It therefore represents the cerebro-spinal fluid and the humours of the eyeball.

Summary

The study of Kapha may now be summarised as follows :-

Derived from **Slisha Aalingane Sleshma**, also called **Kapha** actually means that which joins and supports other materials. The bigger and coarse materials in our body we find in the form of bones and muscles and the union between them can be seen with naked eye as they are coarse and big. We know that the bones, muscles and every part of our body are composed of millions of finer units called cells. Millions of bone cells form one bone as we see it, similarly millions of cells form the liver, muscles and every structure of our body. What binds them to keep them in position and thus enable them to perform a conjoint function ? Each individual muscle cell contracts but the effect of contraction of only one cell will not be sufficient to be able to move a sand particle. When many millions of these cells contract simultaneously, the effect is aggregated. What joins all these fine as well as the big units of our body. It is **Sleshma** or **Kapha. Avalambaka Kapha** the supporting **Kapha**, as the term implies, unites each individual cell of our body and acts as the vehicle for the nutrient element of our body, the **Rasa Dhaatu. Kledaka Kapha** uniting with the hard food particles enters into their interstices thus making them soft so that **Pachaka Pitta** can act on them readily and more efficiently. **Bodhaka Kapha** uniting with the food material makes it soluble so that the taste buds of the tongue can ascertain the taste of the material thus regulating the formation of **Pachaka Pitta. Sleshaka Kapha** unites and lubricates the coarser elements as bone to a bone, muscle to bone, etc., **Tarpaka Kapha** sooths the brain.

Chapter XVI

The Sapta Dhaatus*

The **Sapta Dhaatus** constitute the supporting structures of the body, They are: (1) **Rasa** or the primary product of food digestion, (2) **Rakta** or blood, (3) **Maamsa** or flesh (muscles and tendons), (4) **Medas** or fat, (5) **Asthi** or bone, (6) **Majjaa** or bone marrow and (7) **Sukram** or vital fluid.

The **chief functions** of the seven **dhaatus** in their **normal** condition are as follows:—

1 **Rasa** gives a feeling of satisfaction and pleasure (**preenanam** and **tushti**) and promotes blood-formation (**rakta-pushti**).

2 **Rakta** is enlivening or life-giving (**Jeevanam**), contributes to a healthy complexion (**varnaprasaadam**) and leads to the formation of **Maamsa**.

3 **Maamsa** contributes to the fullness of the body (**Sareerapushti**) and forms **Medas**.

4 **Medas** gives oiliness and warmth to the body, imparts firmness, and stability to the bones and makes for their growth.

5 **Asthi** supports the body (**dhaaranam**) and promotes the formation of **Majjaa**.

6 **Majjaa** fills up the interior and interstices of bones, gives strength and oiliness to the body, causes amorousness, forms **Sukram**.

7 **Sukram** has the property of being quickly emitted, bestows courage and strength, creates a love for the opposite sex and pleasure in their company and is responsible for conception and reproduction (or procreation).

"Rasastustim preenanam raktapushtim cha karoti; Raktam varnaprasaadam maamsapushtim jeevayati cha; Maamsam sareerapushtim medasascha, Medah sneha swedan drudhatwam pushtimasthanaam

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* Extracted from 'The Fundamantal Princeples of Ayurveda, published by the Government School of Indian Medecine, Madras.

cha; Astheeni deha dhaaranam majjanah pushtim cha; Majjaa preetim sneham balam sukrapushtim puranam asthnam cha karoti; Sukram Dhairyam chyavanam preetim dehabalam harsham beejartham cha" – Susruta Sutra Chap. 15, V. 5. See also Ashtaangahridaya Sutra Chap. 11, V. 16–20.

The following are the features present when there is a loss, decline or diminished production (*Kshayam*) of the *Dhaatus*:—

1 **Rasa Kshayam**: dryness, fatigue, emaciation, languor, intolerance to noises and sounds, thirst; discomfort, pain, palpitation and a sense of emptiness in the heart.

2 **Rakta Kshayam**: a desire for sour and cold things, dryness of the skin, a loose and lax condition of the **Siraas**, vessels of the body, roughness of the skin, cracking of the skin, a longing to live in cool places, a withered or faded condition of the body.

3 **Maamsa Kshayam**: exhaustion of the special senses and action senses (**Aksha glaani**), pain in the joints; a wasted condition of the buttocks, cheeks, lips, thighs, genitals, breasts, armpits, neck, calves of the legs, waist and belly; dryness and pain in the various members of the body and a relaxed condition of the **Dhamanee** vessels.

4 **Medo Kshayam**: slimness of the lower abdomen and waist, emaciation, enlargement of spleen; a sensation of emptiness in and bursting of joints; dryness of the skin, a craving for fatty flesh; fatigue; and tiresomeness of eyes.

5 **Asthi Kshayam**: pain in the bones; falling off of hair, nails and teeth: dryness of the skin, nails and teeth; fatigue; looseness of joints.

6 **Majjaa Kshayam**: Rarefaction and porosity of bones; pain, weakness, lightness and a feeling of emptiness of bones; pain in the joints; diminished formation of **Sukram**; giddiness; impairment of vision (**Timira Darsanam**); **Vaatarogaas** (diseases due to **Vaata** vitiation) also arise.

7 **Sukra Kshayam**: impotence; delayed emission of a small quantity of vital fluid or ejection of blood with intense pain in the testicles and burning sensation in the penis during sexual intercourse; general weakness, dryness of the mouth, pallor, languor and fatigue.

(See Charaka Sutra Ch. 17, V. 64 – 69; Susruta Sutra Ch. 15 Line 11; Ashtaangahridaya Sutra Ch 11, V. 17 – 20.)

The following features are exhibited when there is an increase, excess or increased formation (*Vriddhi*) of the *Dhaatus*:—

Rasa Vriddhi: features resemble those of **Kapha Vriddhi**. water brush **(hrillaasam).**

Rakta Vriddhi: redness of the skin, eyes and urine fullness of **Siraa** (vessels), syncope, impairment of the digestive fire; causes the following diseases: **Visarpam** (inflammations of the skin as Erysipelas), enlargement of spleen, abscesses, **Kustham** (skin disease), **Vaata Raktam** (acute articular conditions, neuritis, etc.), **Rakta-pittam** (hæmorrhagic diseases as hæmoptysis, hæmaturia, hæmaphilia, purpura, etc.), **Gulmam** (conditions like Pyloric obstruction, abdominal tumours, tubercular cæcum, etc.), **Upakusa** (inflamed and bleeding gums, etc.). **Kaamila** (jaundice) and **Vyanga** (black circular patches on the face).

Maamsa Vriddhi: excessive growth of flesh in the neck and other parts; an increase in size or fullnes of the cheeks, lips, buttocks, neck, thighs, arms, calves of the legs and abdomen; heaviness of the body; the following diseases are caused: **Gandamala** and **Galaganda, Arbudum** and **Granthi.**

Medo Vriddhi: same features as said under **Maamsa Vriddhi**: exhaustion and breathlessness on the slightest exertion; a pendulous condition of the breasts, buttocks and abdomen; a bad s mell about the body; imparting of an oily gloss to the skin; **Kaasa** and **Swaasa.**

Asthi Vriddhi: increase in the size of the bones and abnormal development of the bony structures; cutting of additional, supernumerary and overriding teeth.

Majjaa Vriddhi : heaviness of the eyes and body : occurrence of slow-healing and chronic ulcers having an extensive base in and about the joints.

Sukra Vriddhi : increased sexual urge and desire ; formation of seminal calculi and concretions **(Sukraasmari)**; increased flow of vital fluid.

In the case of women, we have also to consider the following :—

1. **Aartavam** (Fluids concerned with menstruation): **normal features :—**

(1) has the same properties as **Raktam** or blood.
(2) is concerned with conception or impregnation.
(3) is life-giving or vitalizing (**Jeevanam**).

Aartava kshayam : Features are—

(1) scanty menses (oligo-menorrhoea) or absence of menstruation (amenorrhoea),

(2) Pain in the genital organs,

Aartava Vriddhi gives rise to the following signs and symptoms :

(1) aching of the limbs, (2) excessive flow of blood (menorrhagia), (3) emits a bad smell and (4) gives rise to **Rakta-Gulma**, etc.,

2. **Garbha** (Foetus or product of conception) **when normal** exhibits the characteristics of pregnancy.

Garbha Kshayam : signs here are—

(1) absence of movements of the **Garbham**,
(2) absence of enlargement of the abdomen.

Garbha Vriddhi shows the following signs :—

(1) abnormal enlargement of the abdomen.
(2) diaphoresis (**Sweda**).
(3) dropsical swelling (**Sotha**),

3. **Stanyam** (Breast-milk) when normal contributes to the fullness and cantour of the breasts and maintains the life of the infant.

Stanya Kshayam: causes a shrunken condition of the mammae and a scanty secretion or suppression of breast-milk.

Stanya Vriddhi is characterised by fullness of the breasts, frequent appearance or flow of breast-milk and pain in the mammae.

Ojas

Ojas is the quintessence of all the **dhatus.** Its main seat is the heart **(hridayam),** though it permeates and pervades the whole body.

Its properties are: (1) oleaginous, (2) of a cooling nature **(somagunam)**, (3) pure, (4) slightly reddish-yellow in colour, (5) resembles honey in taste, (6) has the colour of ghee and (7) has the smell of fried paddy **(laja)**,

Its functions.—It is responsible for the maintenance and upkeep of the body. When it perishes, the body is invariably destroyed and life exists only when it exists and the various activities, functions and features of the system are entirely dependent on it.

Causes of Ojokshayam and kshayam of Dhaatus in general. Anger, excessive physical exercise, fasting, care and anxiety, taking food that is dry and insufficient or food in excess, prolonged exposure to winds or the sun, fears and sorrows, taking drinks which produce dryness in the system, keeping awake in the nights, an excessive expulsion or discharge of **Kapha, Raktam, Sukram** and **Malaas** from the system brought about by disease or other causes, afflictions caused by evil-spirits, forces of nature or blows and wasting diseases.

Features of Ojokshayam—Various phobias, weakness, dryness of the body, emaciation, frequent brooding with discomfort in the various organs, loss of body lustre, lack of enthusiasm and interest in the surroundings.

Treatment of Ojokshayam—Administration of milk, meat-juices, and **Jeevaneeya** drugs and medicines.

Increase of Ojas in the system gives rise to a sense of pleasure and satisfaction, bestows strength, promotes nutrition and build of the body.

Dhaatu vardhanam and Dhaatu kshayam—**Amsas** or portions of the **Jatharagni** (digestive fire) extend to the **Dhatus**, constituting the **Dhatwagnis** and a normal condition of these **agnis** is essential for the normal growth and metabolism of the **Dhatus**. An increase or decrease of these **agnis** brings about **Dhatu kshayam** or **Dhatu vriddhi** respectively. Each preceding **Dhatu** when in a **vriddhi** or **kshaya** condition contributes to the growth or decline of the succeeding **Dhatus**.

Chapter XVII

The Malas

This term comprises any of the bodily principles which become unfit for being utilized for building up the body or which are harmful to the body and must be got rid of. The **malas** consist of the following :—

(*a*) those substances which are formed in different parts, tissues or organs of the body, forming a sort of coating, plastering or lining in the holes, orifices and ducts of the body and having the property of travelling towards the exterior for being expelled from the system, when increased beyond a certain measure ;

(*b*) the **Dhatus** which have become over-ripe, decayed or decomposed ;

(*c*) the over excited **doshas**, **Vaata**, **Pitta** and **Kapha** ;

(***d***) all those materials or entities, natural or foreign to the body and which existing in the body, become harmful to it.

The food taken in is converted into an essential and absorbable part known as **Aaharaprasadam**, **Saram** or **Rasam** (essence of food) and an unabsorbable or unassimilable portion known as **Kittam** (dross) or **Malam** (refuse). The **Sapta-dhatus**, **Ojas**, **Panchabhutas**, joint-structures, cementing substances and other limbs of the body derive nourishment from the **Aaharaprasadam** or **Aahara Rasam**, while the formation (**Poshanam**) of urine, sweat, fæces, the three **malas**, **Vata**, **Pitta** and **Kapha**, the excrements from the ears, eyes, nose, mouth, hair-follicles and genital organs, and such growths as hair, beard, nails, etc., is done by the **Kittam**.

Saram supports and nourishes the **Dhatus** as **Rasam**, **Raktam**, etc, and the kittam supports and nourishes the **Malas**

and when they exist in their proper measure, they both keep the **Dhatus** in harmonious conditions in a body in which the **Dhatus** already exist in a normal state. When those **Dhatus** called **prasada**, decrease or increase, it is **Rasam** or the essence of food that restores them to normal.

The channels for the movement or passage of the **Prasada Dhatus** and **Mala Dhatus** are the ducts of the body (**Srotases**), the respective ducts nourishing the corresponding **Dhatus.**

The food taken in and the **Sapta-dhatus** have each their corresponding **malas.** The chief **malas** of food are urine and fæces, derived from the liquid and solid portions, respectively, of the food. The presence of the **malas**, urine, fæces and sweat in sufficient quantity, however, is needed for the proper regulation of the systematic reactions in the human organism and for the maintenance of the body integrity.

The malas of the Saptadhatus are the following :—

[1] of **Rasam** : gross **Kapha** (mucoid secretions from the tongue, eyes and interior of the cheeks).

[2] of **Raktam :** gross **Pitta (Ranjaka Pitta** or bile which gives a coloring to **Rasam** at the time of its conversion to **Raktam).**

[3] of **Maamsam** : secretions from the ear (wax and cerumen) and nose.

[4] of **Medas** : sweat and the excrements from the tongue, teeth, axillæ and penis.

[5] of **Asthi** : nails and secretions from the eyes.

[6] of **Majja** : hair and oilness of the mouth.

[7] of **Sukram** : the oily portions in the eyes, skin and fæces ; **Pitikas** (boils and carbuncles).

The functions of the three malas, fæces (Purisham) ,urine (Mutram) and sweat (Swedam) are as follows :—

[1] **Purisham** : forms a support for the body and is indispensable for its preservation.

[2] **Mutram** : carries the effete watery elements from the system ; fills the urinary bladder.

[3] **Swedam** : moistens the skin and keeps it soft and smooth.

The following features are present when there is an increase or vriddhi of the malas :—

[1] **Purisham** : flatulence, borborygmi, pain and heaviness of the abdomen.

[2] **Mutram** : pain and discomfort in the hypogastrium and bladder, frequent passing of urine, a feeling as if the bladder is full even after it has been emptied of its contents.

[3] **Swedam** ; excess of perspiration with a bad smell, pruritus.

Symptoms and signs when there is a decrease or Kshayam of the malas :—

[1] **Purisha Kshayam** : **Vaayu** moves with noise in the intestines causing a griping sensation ; it wanders all over the abdomen and courses upwards causing much pain and discomfort in the heart and the sides.

[2] **Mutra Kshayam** : passing of a small quantity of urine with great difficulty, pain in the bladder ; the urine is altered in colour or mixed with blood.

[3] **Sweda Kshayam** : absence of perspiration, dryness and cracking of the skin, abnormalities of sensation in the skin, falling off of hair and their standing stiff.

An increase of the **malas** of the eyes, etc., is to be inferred similarly by an increase in their quantity and by tbe heaviness of the affected regions or parts.

A decrease of other minor **malas** in other situations is to be judged by dryness, pain, emptiness and lightness of the seats of the **malas**.

An increase of **malas** is brought about by their accumulation and a decrease of them by an excessive expulsion of the **malas** from the system.

Though an increase and a decrease of the **malas** are both injurious to the organism, a decreased condition of them is more harmful than an increase because a certain minimum quantity of **malam** is essential to the maintenance of the bodily integrity.

Malayanas or Malamaargas.—The anus and urinary passage, the eyes, the nostrils, the ears, the mouth and the innumerable sweat-pores found all over the body are known as **malamaargas** or the channels or seats of **malas.**

When the **malas** get vitiated, they in turn vitiate their respective **malayanas** or **malamargas** and cause diseases in them.

Deha Dhaatu Vijnaanam

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